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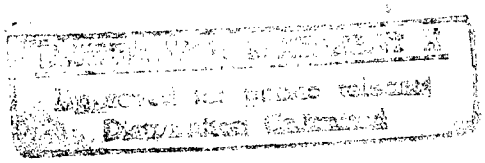

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No 7, July 1989

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AVIATION AND COSMONAUTICS

No 7, July 1989

AF First Deputy CIC Urges Observance of Principles of Perestroyka

91441413A Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 1-3

[Article by Lt Gen Avn Ye. Shaposhnikov, first deputy commander in chief of the Air Force: "Toward a High Level of Combat Readiness—Through Concern for Others"]

[Text] This year is perhaps one of the most difficult and crucial ones for the Armed Forces at the current stage of the restructuring which is taking place in this country. The new foreign-policy thinking of the Soviet leadership as well as our country's peace initiatives have in large measure advanced international relations along the road of detente and strengthening of political trust and mutual understanding. Our country's good will is being bolstered with concrete deeds. The USSR has adopted a defensive military doctrine and is unilaterally reducing its military potential. This requires substantial restructuring of the combat training activities of the Armed Forces as a whole and the Air Force in particular.

Our main precept is to maintain the homeland's defense capability at an adequate level. Facts persuasively attest that the United States and NATO have not given up their policy of force and their endeavor to achieve military superiority. They are continuing a policy not only of maintaining but of increasing powerful strategic arms. They have moved on to the practical business of seeking ways to compensate for intermediate-range and shorter-range missiles, and they are developing new weapon systems based on nontraditional physical principles. Field maneuvers are not being conducted on a less intensive basis, nor has there been a reduction in the number of reconnaissance flights along our borders.

The developing situation demands a considerable improvement in the quality of Air Force personnel military proficiency. The period following the 19th All-Union Party Conference has been characterized for Air Force personnel by an active search for ways to implement this important party forum's guidelines aimed at increasing the combat readiness of the Armed Forces by improving qualitative parameters. Priority designation has been given to such areas as modernization and upgrading of aircraft presently in service, thorough operational mastery of these aircraft by Air Force unit and subunit personnel, a decisive focus on military science, and radical improvement of the entire process of combat and political training.

I can state without exaggeration that a great deal has been done and a great deal has been achieved in these fundamental areas. The following is typical: in contrast to the past, when all practical initiatives proceeded from the higher echelons, from the central authority, today valuable suggestions from the lower echelons are being adopted and implemented as well. Nor could it be otherwise, since perestroyka, democratization and glasnost provide stimulus for responsibility on the part of personnel at all echelons and are extending the boundaries of initiative and innovativeness on the part of all categories of personnel.

At the same time we must note that a conviction has taken root in a substantial number of Air Force personnel, including command and political personnel, that being a supporter of the progressive processes of perestroyka means only performing one's job duties well. In my opinion such a view of one's personal involvement in these revolutionary transformations is excessively simplified. And to some degree it is shortsighted as well, since it develops in people only the ability to carry out instructions blindly, without thinking. Radical changes of course cannot be accomplished with such limited potential. It is a demand of our time that each of us should function in our own job position not only as an effective executing entity but also, so to speak, as a generator of ideas and as a campaigner to implement them.

At the present time we are seeing with each passing day an increasing importance of such meaningful qualities as competence, initiative, a sense of the new and progressive, boldness, willingness and readiness to take responsibility, the ability intelligently to formulate a task and ensure its full and reasonable execution, and the ability not to lose sight of the political significance of one's activities. Nevertheless all these leader qualities will not guarantee successful solution to all the problems facing us if one lacks attention and concern, sincerity and integrity, as well as genuine sensitivity toward and sympathy with one's subordinates.

It is appropriate in this connection to recall the February (1989) CPSU Central Committee Plenum, which addressed matters pertaining to ideological support of perestroyka. It was emphasized at this plenum: "...We support and shall continue to support that which is beneficial to socialism. We reject and shall continue to reject everything detrimental to the interests of the people."

At this point I would like to place special emphasis on the role of personnel initiative and innovation in conditions of one-man command, when it would seem that our entire military service life is thoroughly regimented and regulated by the requirements of myriad orders, directives, and regulations. There is indeed no dearth of guideline documents. But a one-man commander, upon being assigned a task or problem, assesses the situation and, if time and conditions permit, is simply obliged to hear out suggestions by his subordinates prior to stating: "I have made my decision." Air Force personnel initiative and innovativeness and the commander's maturity, foresight, and responsibility should be manifested at this moment of collective mental tackling of a problem.

The main thing here is an attitude of respect for the opinion of one's subordinates and the ability to hear one's subordinates out, to grasp their thoughts and aspirations and, if necessary, to require that they substantiate their statements with calculations. Tactfulness, patience, attentiveness, and thoughtful reason at the stage of elaborating a decision always invisibly but definitely encourage activeness on the part of one's subordinates, unfetter initiative, and give people a feeling of joint involvement in a common cause and, consequently, a sense of responsibility for the end result of the labor of the entire collective. Such an approach enables a commander to eliminate the subjective view and a one-sided grasp of the methods and means of solving a given problem. And this is extremely important.

Subsequently, when the decision has been made, initiative and innovativeness on the part of subordinates should be directed toward prompt communication of tasks to the immediate executing individuals, toward organization of coordination between subunits differing in type of training activity, control and monitoring of decision execution, and rendering assistance in handling the most critical items. The commander's role at this stage consists in visiting all military collectives and personally ensuring that his instructions have been correctly understood and that the personnel involved know how to carry them out.

Thus one-man command under present-day conditions is grounded on initiative, activeness and innovativeness by subordinate personnel. This should always be borne in mind, for otherwise it will not be possible to achieve a situation where an order will truly be taken to heart, so to speak, by Air Force personnel.

I am convinced that such a method in commander work procedures should be dominant not only when a specific mission is assigned, when it is necessary to prepare specific tactical action variations, but also in daily activities. Life is constantly presenting us with problems—large and small, important and secondary, some requiring immediate measures and others stretching out over an extended period of time. They are linked by a common factor: they directly affect the combat readiness of air units and subunits and of the Air Force as a whole.

When planning and scheduling the activities of their units, commanders should not forget that combat readiness is a state of air units and subunits which depends on many factors: continuously-evolving science, technology, and weapons, the degree of proficiency of personnel, their moral-political and fighting qualities, a high degree of military discipline, alertness, and a thorough understanding by each airman of his role in defending the interests of the homeland.

Combat readiness continuously improves with the development and change of these and other factors, with new elements being added, which are advanced by practical realities and which inevitably dictate a new approach to and new demands on the process of combat training activities of units. In order to be equal to present-day demands, to obtain a thorough grasp of the situation, to feel the pulse of domestic and international affairs, and in order correctly to organize and structure training and indoctrination activities, it is necessary to possess profound knowledge of the dialectics of societal development, military and specialized subjects, and to apply them correctly in practice.

Unfortunately one must observe that at the present moment this approach is beyond the capabilities of some Air Force commanders. I believe that this is not so much their fault as their misfortune. Contributing factors include a lack of experience in working with a high degree of independence, a lack of determination and of the boldness to assume responsibility and willingness to make a specific decision of the slightest importance in conditions where it is not possible to obtain the approval and agreement of higher authority. Such commanders attempt to solve problems which are new in spirit and content with old, obsolete methods. Not bothering to seek optimal, more effective combat training variations, they simply increase the work volume and work load on personnel. One is particularly troubled by the fact that there has been an increase in frequency of instances where Air Force personnel have to work on days off, frequently with nothing in compensation. this gives rise to legitimate complaints, deadens people's sense of responsibility, and diminishes initiative.

Another reason this happens is the fact that some persons in authority, when they receive orders, instructions, and directives from higher headquarters, do not interpret them taking into account the conditions and specifics of their subordinates' job or the vital missions being performed by units and subunits. Innovative handling and treatment of documents is replaced across the board by unthinking duplication of instructions from the higher echelon. Hence the useless expenditure of resources and the men's time and labor. Frequently such commanders give the old reply to the question "And what have you personally done toward successful performance of a given task?"—"I gave instructions; I ordered such and such to be done."

I am deeply convinced that this road leads nowhere. Transforming people's enthusiasm and self-sacrifice into an object of opportunistic exploitation and attempts to use these attributes to compensate for organizational miscalculations ultimately lead to ruinous consequences. The worst of these is social apathy and lack of initiative on the part of personnel, engendered by hopelessness and awareness of the fact that the endless last-minute and catch-up rush work will never end.

In order to prevent this, commanders, staffs, and political workers should precisely and efficiently plan and schedule the training process. It is essential to ensure that each and every Air Force officer knows what he will be doing today, tomorrow, next week, and next month. In connection with this it is important to raise long-range

planning to a new and higher level. And once a plan or schedule has been drawn up, it should not be sliced up on a daily basis according to considerations dictated by the fact of a lot of things to be accomplished that day.

Thus by precisely planning and scheduling his work and that of his subordinates, a commander will free himself and his men from various instances of unnecessary waiting around to receive instructions, refined or updated instructions, juggling around of activities, and other negative elements which knock people off balance, as they say. Enormous reserve potential for showing concern for personnel is in my opinion to be found here as well, alongside efficient organization of the training process.

Party organizations, which undoubtedly have become more militant and are displaying greater initiative since the 19th All-Union CPSU Conference, can and should give commanders more assistance.

Certain defects are noted here as well, however. While in the recent past the work done by political agencies and party organizations was characterized by single-channeled criticism from the higher to the lower echelons, today they have shifted to the other extremity—accusations and criticisms have proceeded to flood upward in a one-sided manner. More and more frequently one hears approximately the following: we have unresolved problems because at the central echelon they are unfamiliar with our needs and aspirations.

In my opinion such erroneous points of view occur for two main reasons. First of all, in the line units Air Force personnel are poorly informed on what the higher-echelon headquarters are doing and how they respond to the needs of the line units. Secondly, it has become outright popular in the press to link all shortcomings and deficiencies to sluggishness on the part of the "higher echelon." All this puts us on the edge of idle-chatter faultfinding.

I am convinced that, while not rejecting criticism proceeding both from the lower and higher echelon, party organizations and party members should more firmly and frankly assess their own activities and develop criticism horizontally, so to say. An open and honest discussion in the collective on current activities and a search for constructive methods to improve them is the best remedy against useless, empty talk.

Nor have our scientists as yet had their say, both from the standpoint of operational art and tactics in conditions of a defensive military doctrine and that of their contribution to teaching command personnel forms and methods of working with subordinates in conditions of perestroyka and continuously evolving democratization and glasnost. And yet practical realities urgently demand scientific validation of those processes which are taking place in the Air Force.

The developing situation demands of the central administrative apparatus and command authorities of large strategic formations thoughtful and well-reasoned synthesis and prompt dissemination of experience in restructuring the combat training activities of Air Force personnel, and the results of certification of new organizational and staff structures. We have many innovative command personnel distinguished by depth of reasoning, bold, carefully thought-out decisions, and the ability to unite their men behind the principal mission—achieving a high level of readiness.

I should also like to state the following. Proceeding from the requirements of a defensive military doctrine as well as economical, conscientious utilization of our resources, the total number of tactical air exercises [letno-takticheskoye ucheniye] is being reduced. In connection with this a special role is assigned to tactical air drills or brief tactical air exercises [letno-takticheskoye uprazhneniye]—a kind of "innovation laboratory" with the aid of which one can test out and certify various new innovations both of the training process as a whole and military aviator tactical training in particular.

Full-scale tactical air exercises should be viewed not only and, perhaps, even not so much as a test of performance and proficiency for a team of inspectors as an opportunity to assess and reinforce in a practical manner, in a comprehensive and innovative way, that advanced know-how which has been amassed in the course of routine combat training, to make a final determination of optimal and maximum-effective modes and forms of combat with the potential adversary, and to determine ways to correct revealed deficiencies. Experience and know-how should be synthesized not in a general but rather in a differentiated manner: aircrew, flight, and squadron.... In my opinion this approach will help cure us of the old "malady" of going for quantity in combat training to the detriment of quality.

Large, difficult tasks face the Air Force. Their accomplishment will not be easy. There are various ways to accomplish them. These include improving organization and orderly routine in the units, optimization of the work day, and scientific validation of methods of surmounting various problems.... But I believe the principle of "To a high degree of combat readiness through concern for Air Force personnel" is a determining principle at this time, for essentially the principal end goal of the restructuring that is taking place in this country is to improve people's lives.

When I was serving as commander of air forces with the Group of Soviet Forces in Germany, I witnessed the following significant and highly instructive incident. Local personnel were building a new airfield and housing for us. They did not turn over the completed airfield until the last officers' quarters building was ready for occupancy, although the airfield had long since been completed. This is an example of a caring government approach to concern for the military! Unfortunately, in this country one frequently observes exactly the opposite. A regiment relocates to its new base even before the construction crews have completed the taxiways, so to

speak. As a result personnel and their families are placed in very difficult living conditions. Can one expect the men to put out a full effort? Can there be any joy in one's work?

Of course there are subjective financial difficulties caused by the present state budget deficit, to ignore which would be naive at the very least. But it is also obvious that one cannot forever use these difficulties as an excuse. All of our finest intentions will remain nothing but empty declarations if we again (for the umpteenth time!) lose sight of concern for people. Let us speak frankly: today is a critical turning point for radical sociopolitical and economic reforms. We have no further avenue of retreat in this matter.

Improving Job Performance of Aircraft Maintenance Personnel

91441413b Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 4-5

[Article, published under the heading "Combat Training: Parameters of Quality," by Maj I. Petrakov, flight commander, delegate to the 19th All-Union CPSU Conference: "Sources of Professionalism"]

[Text] Sometimes they say about a given aircraft maintenance specialist that he knows the equipment down to the last nut and bolt. That is certainly a flattering comment, but in my opinion this level of knowledge is no longer sufficient in today's Air Force. Alongside the accustomed, to some degree routine operations, operations which require knowledge of the design principles of systems of functional linkages and their physical essence are becoming increasingly important today. Excellent quality parameters cannot be achieved without such knowledge.

Today electronics comprises the core of an aircraft's equipment and determines its specifications and performance characteristics. This places a considerable imprint on our activities. Accuracy of navigation and weapons delivery depends in large measure on the onboard digital computer software, for example. In the unit with which I serve, pilots Sr Lt I. Romashov and O. Zenchuk have successfully mastered programming. Is it then surprising that they have achieved excellent results against ground targets? This is due to the pilots' excellent skills in operating the onboard computers.

Party members at regimental headquarters submitted an interesting proposal pertaining to adoption of computer hardware in the process of flight operations record keeping, planning and scheduling. The higher echelons responded to this initiative with positive interest. Lt Col B. Babayan, assigned to our unit upon graduation from the Military Air Academy imeni Yu. A. Gagarin, enthusiastically set about further development of these ideas. The practical experience of daily combat training suggests that the time has come for the bulk of informational data to be stored in the computer rather than recorded on paper. For this reason an officer who fails to learn to use a computer as easily, for example, as a dead-reckoning plotter may soon be like a person who can neither read nor write.

Knowledge and inquiry engender new things. This practical axiomatic truth is confirmed by the experience of our aircraft maintenance unit. They have amassed considerable experience in performing routine inspection, servicing and maintenance procedures in the shortest possible time, with minimal labor expenditures. Frequently maintenance personnel travel out to field sites and perform aircraft mission-readying procedures away from the base, and with reduced-size field aircraft servicing and maintenance teams. And yet the quality of maintenance operations does not suffer in the slightest from this. This is logical, for one out of every two maintenance specialists in the aircraft maintenance unit has an advanced proficiency rating.

Aircraft maintenance unit chief Capt L. Bagayev, his deputy for political affairs Capt I. Marchuk, and party bureau secretary Maj V. Moiseyenko devote a great deal of attention to organization of their men's labor. Specialist personnel are placed in such a manner that each has a high work loading and is provided optimal work conditions. Utilization of such advanced forms as the linked-node continuous-progression system [potochno-uzlovoy metod], working according to maintenance procedures sequence schedules [tekhnologicheskiye grafiki], and maintenance intermediate inspection checkoff ensures a high quality of performed maintenance procedures.

Take, for example, the aircraft engine diagnostics, maintenance and analysis group headed by Capt V. Nosovitskiy. This small team has long been among the leaders. Just in recent weeks the group's maintenance specialists have discovered and corrected several aircraft engine defects and malfunctions which could have led to serious consequences. They included a second-stage compressor blade failure and excessive afterburner flameholder lining depletion.... We pilots are very grateful to the aircraft maintenance unit people for their alertness.

Not only is the design and construction of today's aircraft and its equipment highly complex. Speed, vibration, and other operational stresses age the airframe and powerplant, instruments and onboard systems, and this inevitably causes various problems, which can result in an in-flight emergency. This is why a responsible attitude is so highly appreciated in every maintenance specialist, who performs many different operations and procedures. One can state with confidence that not only the results of every flight operations shift but also flight safety and pilots' lives depend on conscientious work and alertness on the part of the engineers, technicians,

and mechanics when performing servicing and maintenance operations and correcting malfunctions.

It sometimes happens that an insufficiently-experienced maintenance specialist is unable to find the cause of a malfunction but is embarrassed to admit it. Such persons must be reminded that in professional matters false embarrassment is not only inappropriate but even harmful. Our unit's best aircraft technicians, such as Sr Lt I. Minakov, have learned this well. At a party meeting he once said the following to his young colleagues: "If there is something you do not understand, if you have been unable to pinpoint the actual cause of a malfunction, and if you are unsure as to whether an inspection has been complete and sufficient, ask help of an experienced comrade, turn to a veteran, and inform your group chief. Maintenance personnel alertness and maturity and genuine technical knowledgeability consist in not leaving unexplained the cause of even a malfunction which appeared for a short time and then disappeared."

The validity of this statement is confirmed by an incident involving aircraft maintenance technician Sr Lt V. Palgov. Upon completing a training sortie, a pilot had mentioned a possible equipment malfunction. The flight operations shift was ending, and Palgov decided to put off correcting the problem until the following day. The following day, however, he was unable to determine the cause of the problem. He did not ask for help, taking it to be merely a chance malfunction.

But the problem reoccurred. At this point the efficiency and competence of this maintenance technician came into question. Senior Lieutenant Palgov will long remember this incident: his fitness for the job had been brought into question. He would have to rebuild his shaken reputation with solid practical proof of competence.

I have also witnessed an instructive example in my own work experience. Lt A. Sitov reported for duty with our flight upon graduation from aviation technical school. His knowledge of theory was quite good. The lieutenant very quickly mastered maintenance procedures on a new and unfamiliar aircraft and was approved to perform unsupervised servicing and maintenance procedures. But after about three months he began to complain that he was having a hard time learning the "secrets" of aircraft maintenance. I had to remind Sitov of the simple fact that expertise does not come immediately but is achieved at the cost of hard work, by repeating the same maintenance procedures and operations over time and time again.

The development and improvement of skills is a complex process. Of course a maintenance specialist's skill should be grounded on a theoretical foundation, but nevertheless personal experience also always forms part of this foundation. Three years have passed since the above incident. Sr Lt A. Sitov is now one of the unit's finest aircraft maintenance specialists. For success in combat and political training and outstanding performance in socialist competition he has been awarded the Distinguished Military Service Medal, 2nd Class.

"The desire to become a highly-proficient maintenance specialist," says squadron deputy commander for aviation engineer service Maj N. Nabok, "should always be reinforced by the endeavor personally to take part in preflighting an aircraft or performing aircraft maintenance and repairs. Neither experience nor skill can be increased without hard work. A person who never gets dirt under his fingernails—be he an officer, warrant officer, or primary-rank enlisted man—will never become an expert at his job."

One must agree with the view of this veteran engineer. Complex aircraft systems require rigid observance of proper maintenance procedures. It is inconceivable to accomplish the missions of maintaining a high level of combat readiness and flight safety without promptly and precisely following the uniform rules and procedures of operation and maintenance which have been worked out through practical experience and are formally articulated in methods documents, manuals and regulations.

Our squadron's party organization and all squadron personnel had serious complaints about aircraft maintenance technician party member Sr Lt A. Kravchenko. Here is what happened. On the day preceding flight operations, according to instructions issued by the Chief Engineer of the Air Force, all potentially fire-hazardous locations on an aircraft are to be inspected. Kravchenko failed to do this, but nevertheless on the following day he reported that the aircraft was ready to go.

It was ascertained that he had violated procedures, and the aircraft was removed from the flight operations schedule. Disciplinary and party punishment was imposed on Kravchenko for his misdeed. But punishment of course is not the point. Observing procedures discipline means precisely following specifications and the requirements of maintenance procedures checklists and manuals. Unfortunately not all my colleagues follow this requirement. Nothing other than incompetent actions on the part of Capts Yu. Yakimenko, I. Ruzanov, and V. Tarakanov can explain the fact that ordnance failed to release on a sortie to the range. These incidents somehow seem out of keeping with the title on the officers' graduation diploma: engineer-pilot....

Here is an example of precisely the opposite. Young pilot V. Teterskiy was to fly a bomb strike on a point target at the air-to-ground range. The lieutenant took off on schedule and turned to the range heading. Indicator lights suddenly flashed on, and the cockpit annuciator voice synthesizer warned of a hydraulic booster system failure. The pilot glanced at the hydraulic pressure gauge and saw that the pressure reading was abnormally low. He made the only correct decision under the circumstances: he aborted the training mission. Reporting the situation to the tower, he received clearance and set up his landing approach.

The air traffic control team, headed by Military Pilot 1st Class Col P. Sevostyanov, did everything they could to assist the lieutenant. Acquitting himself well, Teterskiy landed safely. He was subsequently given an award.

At the 19th All-Union Party Conference I had the good fortune to meet and talk with three-times Hero of the Soviet Union Mar Avn I. Kozhedub. We talked about a number of problems. This famed pilot, recalling his early years in the military, stressed: "My teachers taught me to respect my aircraft. It is like an airplane says to its pilot: study me thoroughly, and I will serve you, but if you treat me carelessly, I will punish you. Under combat conditions I grasped well the fact that the slightest mistake, the slightest omission in readying an aircraft on the ground will have a fatal effect in combat."

Practical experience indicates that an officer with a high level of engineering knowledge and and a high overall level of competence is capable of developing a specific work style grounded on technical foresight and professional alertness. I shall cite an example. Aircraft technician [crew chief] Sr Lt A. Zhuk, while readying his aircraft for the next sortie, discovered a crack on the afterburner igniter. This officer prevented a dangerous in-flight emergency by conscientious performance of his duties.

Capt A. Burba, Sr Lts S. Sinitsyn, O. Gerasimov, M. Graur, V. Ivanyuk, and V. Lyukov, and Lt I. Mufteyev have performed equally skillfully on repeated occasions. Their experience attests to the fact that the role of the so-called personal factor in preventing air mishaps is considerable. The ability of an aircraft maintenance specialist to recognize a problem is grounded not on assumptions, guesses and intuition but rather on thorough knowledge of the equipment and skilled use of test equipment, that is, on a scientific foundation.

An important indicator of a high level of officer technical knowledgeability is active participation in innovative activities and the ability to solve complicated problems at the level of invention and valuable efficiency innovation proposals. In our unit, for example, more than 10 efficiency innovation proposals have been drawn up and adopted with the direct participation of Maj S. Agadzhanyan. The most interesting of these are a digital logic tester and probe. They are designed for testing and repairing computer hardware. An improved timer has been installed in the performance monitoring room, and an illuminated display panel at the engineer's command post. Display stands in the tactical training classroom, built by handymen in the regiment, have been operating faithfully for several years now. An equipment test panel designed and built by Sr Lt M. Lyalko has prevented the occurrence of several in-flight emergencies. These innovations have produced considerable economic effect and have made the job of aircraft maintenance personnel easier.

The main tasks of military aviation personnel include becoming genuine masters of modern aircraft and utilizing their combat capabilities with maximum effectiveness. Knowledge is needed in order successfully to accomplish these tasks. There is no other way to increase job proficiency.

Professional Psychologists, Sociologists Needed in Military

91441413c Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 8-9

[Article, published under the heading "The Reader Continues the Discussion," by Lt Col V. Voronin and A. Aleksandrov: "Lost Connection"]

[Text] **The editors keep receiving responses to the article by Maj Gen Avn A. Bystrov entitled "Democratization of Command and Control: Ways and Methods" (AVIATSIYA I KOSMONAVTIKA, No 1, 1989). Many readers submit specific suggestions on increasing the effectiveness of command and control of military units, on democratization of life in the military as a whole, and activation of the human factor, without which performance of the missions assigned to the Air Force is inconceivable.**

* * *

The acute problem of organization of a sociopsychological service in the Armed Forces is currently being placed on the agenda. This was fostered to a considerable degree by discussion of the question of sociology at a CPSU Central Committee Politburo session and the subsequently-issued decree. Most-favored-nation status has been granted to Soviet sociology, if one may put it in these terms. And this became possible thanks to perestroyka and a policy of glasnost and democratization of our society.

One could say that without sociological science society is like a blind man. It is playing a particularly important role in the period of perestroyka, when each new step and each adopted decision affects certain interests of various groups. It is a task of this science to possess knowledge of and take into account public opinion to the fullest possible degree, to obtain truthful information on the state of affairs, and to forecast and predict management activity. This is why plans call for expansion in the immediate future of training of psychologists and sociologists at this country's higher educational institutions, with both an increase in numbers and substantial improvement in quality. This matter is to be resolved in a radical manner. In the meantime, however, as was noted at the recent 7th All-Union Congress of Psychologists held in Moscow (one of the authors of this article took part in the congress), there are currently far fewer psychologists per thousand population in the USSR than

in the United States. Particular attention is being devoted to psychological service in the armed forces of the Western nations.

Under conditions of improvement in the qualitative parameters of the Soviet Armed Forces, military sociology and psychology are called upon to promote effective resolution of key problems pertaining to improving command and control of military units and activation of the human factor. In addition, these sciences are to make a substantial contribution toward eliminating negative phenomena in multiethnic military units and toward strengthening discipline and rule of law.

What are our points of departure in this area? As we know, military sociological studies were conducted in the Red Army back in the 1920's. We have a certain amount of experience in this regard. This applies to methodology, method of investigation, as well as utilization of practical results.

Recent establishment of a Center for the Study of Military Personnel Opinion under the Main Political Directorate of the Soviet Army and Navy opened up extensive possibilities for systematic study of personnel moods and attitudes as well as the degree of actual participation in perestroyka by military personnel.

Nevertheless there still remain a great many unresolved issues, particularly as regards psychologist and sociologist cadres. The Military Political Academy imeni V. I. Lenin alone is currently graduating each year approximately 20 military psychologists, while approximately 20 military sociologists will be graduating next year. In spite of this fact there continues to exist the opinion that such specialists are totally unnecessary in Air Force subunits and establishments. Reference is made to the fact that the units contain political workers whose job is to deal with these matters. This statement is correct, but at the present time not all political workers are being trained at military educational institutions as specialists in psychology and sociology.

I believe that the main reason for such an attitude lies elsewhere. Up to April 1985 there was virtually no requirement or demand for psychologists and sociologists. At that point the method of command and control by administrative fiat was in full swing, and the individual was viewed as a "small cog in the works," submissively executing the administrator's will. Even today the authoritarian method of command and control of military subunits and units continues to exist. For this reason many persons in authority view psychologists and sociologists as unneeded specialist personnel. In addition, unfortunately the level of knowledgeability in the area of education science and psychology remains very low with many commanders, political workers, and other leader personnel.

There is also another factor. Practical psychology continues to be woefully inadequate to the needs of the military. Frequently it explains events and phenomena in such a confused manner that practically nobody understands them or, on the other hand, explains them in such a primitively simple manner that persons at the practical level lose interest in them, since it does not take scholarly discourse to understand that there is a problem and that no qualified help can be expected from any quarter.

One should also note the low level of professional expertise on the part of many specialists. There are no manuals or textbooks on the psychological labor of military units of various areas of specialization which would be convenient and useful for practical application. We can state on the basis of our own personal experience that few of the existing textbooks and methods manuals on psychology can be of practical benefit.

Our Air Force units consist for the most part of young military personnel. They are characterized by a maximalist attitude and inadequate life experience, a sureness that their decisions are without error, and an inability safely to emerge from difficult, sometimes critical situations. They are not always capable of felicitously choosing means of establishing one's own identity. Commanders and political workers sometimes fail to take this into account, and they lack information on motivations for good and bad actions and for taking prompt and timely steps to prevent undesirable consequences. We sometimes say bitterly to ourselves: "We were too late, and yet we could have helped a comrade and kept him from taking that fatal step." But we failed to intervene in time. Why is it that at a difficult moment our comrade in arms is left on his own to handle misfortune?

There now are "crisis hot lines" at many service schools. But the phone seldom rings, primarily because an educator and psychologist is not waiting at the other end of the line, and this essentially means no communication.

Perestroyka has reached all military units and has pulled every specialist, student and cadet into the whirl of events. Perestroyka is proceeding in a complex manner. Each serviceman has increased responsibility for the fate of his military collective, for the combat readiness of his subunit and unit, and for flight safety. But nervous stress on both private and general is also sharply increasing.

Experience both here and abroad indicates that in conditions of the revolution in science and technology more and more people are experiencing psychosomatic disorders. Society expends considerable resources on their treatment, but no tangible positive result is being achieved. Essentially healthy individuals, they need only the assistance of a qualified psychologist and a certain adjustment of their emotional state.

Unfortunately it is almost impossible to obtain such help. If we consider that the daily life and activities of pilots, navigators, engineers, technicians, and specialist personnel of service and support units are constantly filled with stresses, the need to form in the Air Force a psychological assistance establishment and an extensive sociopsychological service network becomes obvious.

A military unit is like a living organism. It is constantly in need of prevention and treatment of its inherent "ailments." This requires specialists in psychology as well as regular conduct of sociopsychological studies of the "microclimate" and adoption of effective preventive measures. If this is not done, the unit's "ailments" are driven deep into the organism, and it is incapable of effectively performing its intended functions. In our opinion a combination of several important factors determines the success of these efforts: qualified specialists; high-quality diagnostic equipment and preventive measures. In addition, the personnel of this prevention and cure establishment should be morally indoctrinated. They should not fear confronting the results, no matter how grave they may be.

Recently a team of officers from the Air Force higher educational institutions administrative staff was working at the Vasilkov Military Aviation Technical School. The reports submitted by the school's commanding officer and the political section chief indicated that the school was successfully accomplishing its assigned tasks and that the moral-psychological climate in the military subunits was healthy. A great deal had in fact been done at this school to provide the students with good living conditions, to develop and expand facilities, to equip the training airfield, to set up classrooms dealing with new aircraft and general military regulations instruction, as well as training systems, including flight simulators.

But the following item drew the inspecting team's attention. Approximately 150 cadets had been dismissed from the school for various reasons in a single school year. In addition, and this was apparent to the naked eye, so to speak, there was occurring a steady increase in gross violations of military discipline.

A thorough study of the state of training and indoctrination activities as well as sociological studies indicated the fact of serious errors of omission in the practical activities of commanders, political and Komsomol workers. In the campaign for firm discipline, organization and orderly procedure they had been counting not on modern forms and methods of working with the cadets but rather on intensification of the method of management by administrative fiat and coercion and extremely harsh disciplinary measures: confinement in the stockade, denial of passes, and frequent extra duty. Individual-basis indoctrination work had been neglected.

When working with students, many commanders are guilty of abusive rudeness and intimidation by threat of dismissal. There had been instances of personal humiliation. The inspired words from a letter addressing officer personnel from the Minister of Defense and the chief of the Main Political Directorate of the Soviet Army and Navy, to the effect that if the seeds of a respectful attitude toward one's subordinates are planted in the heart of the cadet and future officer, these seeds will bear fruit throughout his future career, were forgotten. It is not surprising that many cadets replied in the negative to a confidential survey question: "Are you satisfied with your life at the school?". Some of those surveyed replied in the negative to the question: "If you were given the opportunity right now to select a service school, would you make the same choice?"

Why did the school's command element and political section fail to see in a prompt and timely manner errors of omission in indoctrinational work and fail to take the necessary steps to correct them? There are many factors involved. One of them is a lack of sociological and psychological studies. Preventive efforts with the cadets proved ineffective. Democratic forms of communication with the students and glasnost were distorted. Lacking adequate knowledge of cadet moods and attitudes or the emotional and psychological state of these future officers, commanders and political workers were unable properly and correctly to organize the process of indoctrination and were forced to make even harsher the already harsh discipline. It is obvious that this failed to produce benefit.

Perestroyka in the Soviet Armed Forces, which seeks to ensure effectiveness of defense organizational development primarily with qualitative parameters, has advanced to the forefront the task of activating the human factor. This task cannot be accomplished with old forms and methods and without suitable specialist personnel. And this does not require increased staffing. In our opinion it is necessary substantially to alter the directional thrust in the training of political and Komsomol workers.

We feel that it is high time for military educational institutions to train larger numbers of specialist-professionals—psychologists and sociologists—while at the same time teaching them the fundamentals of conduct of party-political work. Indeed, how is it possible in present-day conditions to organize and conduct it correctly without studying the processes taking place in military units? It is also apparently for this reason that the campaign against distortions in disciplinary practices and relations between military personnel which are contrary to regulations is little effective.

If a well-organized social and psychological service and psychological assistance were functioning in the Air Force, how many air and other accidents, family and personal crises could be prevented! The moral and psychological atmosphere in military units would be better and, most important, feedback would begin operating between command and control decisions and the results of the airmen's work. This also means activation of the human factor and satisfaction with one's job and personal life. In the final analysis this also constitutes the foundation of a high level of combat readiness, flight safety, and firm military discipline.

Aircraft Overhaul Depot Progress in Economic Accountability

91441413d Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 10-11

[Interview, published under the heading "Implementing the Decisions of the 27th CPSU Congress," with Maj Gen Avn Viktor Ivanovich Baryshnikov by AVIATSIYA I KOSMONAVTIKA correspondent: "In Step With the Times"]

[Text] **The radical economic reform underway in this country is picking up speed. The party expresses its significance and directional thrust with the following formula: more socialism, more democracy. The reform has also penetrated deeply into the Air Force's aircraft repair and overhaul system. Our correspondent asked Maj Gen Avn V. Baryshnikov to tell us how restructuring of aircraft repair and overhaul operations is progressing.**

* * *

[Correspondent] As we know, Comrade Major General, Air Force aircraft overhaul depots are operating in conditions of full economic accountability and self-financing. Just as any new, serious undertaking, this evidently also required considerable preliminary work.

[Baryshnikov] Yes, we began this work in 1987. It included political, organizational-technical, and economic aspects. Primary attention was focused on refresher training in economics for cadre personnel, ensuring stable performance of production schedules, and increasing efficiency of utilization of all types of resources. On this foundation a task was formulated: to strengthen the financial condition of enterprises and to improve internal production economic accountability.

First of all refresher training was arranged for aircraft repair and overhaul facility executive and administrative personnel in training courses provided by USSR Gosplan, the Moscow Finance Institute, the Riga Advanced Training Institute for Specialists in the Economy, as well as courses under the auspices of other educational institutions.

After this we organized continuous production-management training of personnel at the enterprises, in conformity with standard programs which had been reworked taking into account the specific features of Air Force aircraft maintenance depots.

We proceeded from the position that if workers, foremen, specialist personnel and white-collar employees did not learn to use well the new instruments of management, economic accountability would remain at the enterprise executive and administrator level. Of course such "top-end" economic accountability will not produce the desired results. In addition to providing retraining and refresher training for personnel, we ourselves had to assimilate and promptly communicate to the associations and enterprises methods and guideline documents pertaining to organizing work operations at Air Force aircraft maintenance depots under the new conditions, to debug, tune and adjust the new process of planning-economic and management activities of workforces in strict conformity with the USSR Law on the State Enterprise (Association).

I believe that methods conferences with executive and administrative personnel of associations and enterprises and with secretaries of party and trade union committees helped in this regard. Specific regional features as well as the specific features of repair and overhaul of aircraft of different types were also taken into consideration.

Priority-pace adoption of elements of full economic accountability in some workforces produced considerable benefit. Following thorough analysis and supported by experience and know-how, we would draw up appropriate recommendations on improving the mechanism of economic management and pass them on to other enterprises. This method proved effective.

Implementation of the CPSU Central Committee, USSR Council of Ministers, and All-Union Central Trade Union Council decree prescribing the adoption of new wage terms and conditions was also at the focus of our attention. There is no need to argue that utilization of all possibilities contained within the new system of organization and remuneration of labor is becoming an important factor in development of people's job-related and creative activeness and activation of deep-lying production reserve potential.

In view of the fact that all our enterprises were to convert over to full economic accountability and self-financing effective 1 January 1989, workforces undertook additional steps and found the possibility to complete transition to the new conditions of labor remuneration before the end of last year. More than 34 million rubles were obtained for this purpose from internal reserve potential, with improving wage rate fixing on the basis of organizational-technical measures becoming the principal source for the additional funds. Output quotas were raised by more than 30 percent. Wage preference was secured for highly-skilled workers, and the prestige of engineering labor was raised. Blue-collar worker wages increased by 3.4 percent, to approximately 243 rubles, while wages of specialist personnel and white-collar employees rose 13.7 percent, to 266 rubles.

[Correspondent] Does this mean that last year's work performance became one of the factors in appraising the preparedness of workforces in the Air Force aircraft overhaul depot network to operate in conditions of full economic accountability?

[Baryshnikov] Yes. I can state that the entire package of preparatory measures enabled our enterprises successfully to complete the 1988 plan. Commodity output volume grew, labor productivity rose, and delivery of complete work was fully accomplished. All enterprises achieved a rate of labor productivity growth that was higher than the average monthly wage incremental

growth rate. Savings from adoption of scientific and technological advances into production totaled 35 million rubles. Typically, the entire production volume growth was achieved by increased labor productivity. The best results were achieved by the workforces headed by experienced production operations people P. Voronko, V. Kupch, V. Lyubinskiy, A. Chebotnikov, and I. Pavlov.

Thus we have laid down a pretty fair foundation. Without this foundation it would be much more difficult to resolve many of today's problems.

[Correspondent] So, as of 1 January 1989 the Air Force's aircraft overhaul depots have been operating in conditions of full economic accountability and self-financing. Of course this is too short a time for synthesizing conclusions on performance, but what kind of preliminary results are being achieved?

[Baryshnikov] It is true that our enterprises have not been working long under the new conditions. Certain trends are already apparent, however. First of all we should note that we can see greater stability in meeting monthly plan targets. Goods delivery targets have been 100-percent met by all enterprises. The rate of economic growth has increased. Output volume is up 7.1 percent over last year, while labor productivity is up 12 percent. Considerable work has been done on improving and extending plant internal economic accountability and in development of collective forms of organization of labor.

In addition, enterprises now have considerably more power to utilize labor results, which has helped increase the efficiency of their operations. Production cost has decreased significantly, and nonproduction expenditures have decreased as well. This has resulted in approximately 2 million rubles additional economic incentive funding.

The majority of enterprise managers and workforces understand that the road to high end results lies primarily in adopting economic management methods, forming and shaping economic thinking, and instilling socialist enterprise and efficiency.

Advanced forms of plant internal economic accountability are being adopted with greater success in the workforces headed by S. Samsonov, V. Mironov, A. Olefir, V. Bogatyrev, and A. Bobrov.

This year the Air Force's aircraft overhaul depots, guided by the USSR Law on the State Enterprise (Association), chose the first model of economic accountability. At the same time the second model is being adopted at the enterprise headed by Comrade V. Mironov. This will enable us to compare performance results using both forms of economic accountability and to draw up recommendations on their application. Thus we are also looking toward the future.

[Correspondent] As we know, the 19th All-Union Party Conference stated the question of accelerating the process of saturating the market with consumer goods not only as regards civilian enterprises but defense enterprises as well. What has been the participation of the Air Force's aircraft repair and overhaul workers in accomplishing this task?

[Baryshnikov] They have taken most direct part in this. And their participation is becoming increasingly more extensive. For the sake of accuracy we should note that prior to September 1988 this work was being conducted in a sporadic manner, with enterprise managers and workforces considering it to be of secondary importance. The All-Union Party Conference, however, forced them to reassess this problem. Last fall we began to take more effective steps to get things going right. While last year consumer goods volume totaled approximately 1 million rubles, in 1989 it will total 20 million.

A methods conference of representatives of aircraft overhaul depots responsible for the manufacture of consumer goods was organized in order to step up efforts connected with this complex, multilevel task. The conference was attended by officials from USSR Gosplan, the Moscow Soviet Price Administration, and the Central Finance Directorate of the USSR Ministry of Defense.

Consumer goods exhibits, at which our capabilities were graphically displayed, were organized for the purpose of studying demand and exchanging know-how.

[Correspondent] What kind of consumer goods are aircraft overhaul depots producing?

[Baryshnikov] The most varied goods. They include tableware, gardening tools, sporting goods, recreational goods, household electric appliances, household decorative articles, kitchen furniture, automotive and household appliance spare parts.

As you can see, this is quite an impressive list. But we do not intend to limit it at that. The variety of goods will continue to expand in conformity with our capabilities and consumer demand. Some things we shall produce entirely ourselves, while others will be manufactured as co-production with enterprises in other branches of industry.

[Correspondent] Viktor Ivanovich, can you give us any specifics about future developments in this area?

[Baryshnikov] Of course. I believe that your magazine's readers not only are entitled to know but also need to know that we are approaching resolution of this matter with a strong sense of responsibility.

We have just drawn up a draft plan for 1990, which calls for increasing volume of consumer goods manufacture by more than double over this year. In order that this plan not remain merely on paper, we are taking steps to establish specialized goods manufacturing facilities. We must also establish independent structural subunits at

our enterprises, which would perform functions of studying consumer demand, preparing documentation, goods manufacture and marketing.

In addition we must conduct extensive explanatory activity with workforces, communicate to all workers and employees the sociopolitical significance of the task at hand, and more extensively utilize new forms of organization of labor, such as production internal economic accountability, the group and lease-agreement contract.

The people at our enterprises are familiar with and understand everything I am telling you. They do ask questions, however: in order to meet the plan targets we need material resources and supplies, specialized equipment, and specialist personnel, the kind of training we have not provided in the past, etc. In the meantime the situation is becoming more complex. We have not yet resolved, for example, the matter of allocating funds for basic types of resources and specialized equipment for consumer goods manufacture in 1989. Nor do we have a clear picture of next year. We cannot help but be concerned over this situation.

Of course consumer goods manufacture is not limited solely to the above-mentioned problems. There are many problems involved. But right now there is perhaps agreement on what the main problem is: it is the long-term program, which is of national importance, and it must be accomplished.

[Correspondent] Our magazine has stated that Air Force industrial enterprises are taking part in implementing the Food Program.

[Baryshnikov] Yes, they are. All Air Force aircraft overhaul depots have now set up sideline farming operations. Last year they produced output totaling 330,000 rubles. This included 137 tons of vegetables, 118 tons of grain, 12 tons of honey, and 191 tons of meat. And there is a general upward production trend.

Assessing the state of affairs from the standpoint of the demands of the March (1989) CPSU Central Committee Plenum, however, I would like to state that these results are extremely modest, that there are both shortcomings and unutilized reserve potential in this area. None of the farming operations have a dairy unit. Approximately 70 farming operations are currently operating at a loss. The problem of livestock raising can be resolved primarily by farms producing their own feed, and this requires allocating acreage for use by aircraft overhaul enterprises. As a rule difficulties arise precisely on this point. Many of our enterprises are located in large cities, where there is no possibility of the USSR Ministry of Defense allocating such acreage. Nor are local authorities resolving this problem.

We are currently organizing the training of specialist personnel for subsidiary farming operations, and we are educating the managers and administrators of public organizations and workforces to understand their needs and concerns. In short, work is in progress. But I believe that we shall be able to claim results only when all our workers and employees are receiving a substantial supplement to their table.

[Correspondent] Since we have touched upon such important, relevant items as consumer goods production and implementation of the Food Program, we would like to know what is being done at Air Force aircraft overhaul enterprises in the way of development of the social domain?

[Baryshnikov] I shall answer your question as follows: if we wish successfully to accomplish the tasks of repair and overhaul of aircraft (and we do), it is essential to raise the level of social development of the workforces across the board. Much has been done in this regard. All of our enterprises have their own community services funds, the majority maintain meal serving facilities and kindergartens, while many also operate therapeutic rest facilities, rest and recreation facilities, recreation and cultural centers or clubs, as well as other facilities.

As we know, however, the main task of perestroyka is to turn toward people's needs and concerns. Therefore our targets for the 12th Five-Year Plan called for spending 38 percent of all capital expenditures on building housing, social and cultural services facilities. We have adjusted these figures upward, however, and the 1989 plan calls for the percentage to be increased to 60 percent.

In the last three years 25 apartment buildings totaling 2,045 units, three dormitories, a kindergarten accommodating 320 children, and two meal serving facilities have entered service. We presently have housing construction plans extending up to the year 2000. In order to provide housing for all those in need, we have earmarked an increase of 50 percent in funds allocated for building housing in the 13th Five-Year Plan over the figure in the 12th Five-Year Plan, while the figure for the 14th Five-Year Plan will be larger by a factor of 2.2.

Aircraft overhaul enterprises are also utilizing other possibilities for solving the problem of housing construction, such as construction on the basis of shares participation with local authorities, construction employing independent financing, individual construction, and MZhK [arrangement where young people donate their free time to helping in construction of local facilities, in return for which they receive housing allocation].

I cannot help but note, however, the indecision with which some enterprise managers and workforces are approaching the matter of accomplishing social development tasks, as well as their poor utilization of economic incentive funds. We endeavor to take effective measures in each specific case. On the whole, however, all of us are learning to live, work, and manage in the new manner. As was emphasized at the USSR Congress of People's Deputies, this is a demand of the times.

[Correspondent] Viktor Ivanovich, there is no question that aircraft overhaul enterprises are accomplishing important economic tasks. But some of our readers might ask whether the main thing—ensuring a high degree of Air Force combat readiness—is not receding to a position of secondary importance?

[Baryshnikov] By no means. We are all fully aware that implementation of the package of measures pertaining to social development of workforces and increasing consumer goods manufacture and agricultural production cannot be accomplished to the detriment of Air Force operational readiness.

In the 13th Five-Year Plan the aircraft overhaul depot system is faced with even tougher tasks pertaining to continued securement of Air Force operational readiness. For this reason we are planning enterprise renovation and retooling, providing them with highly-productive equipment and computers, with a constant effort to improve the job skills of aircraft overhaul personnel, and creating all necessary conditions to increase the prestige of the work they do.

The Air Force's aircraft overhaul enterprises are already engaged in readying facilities at a priority pace to receive fourth-generation aircraft, which will require a search for new repair and overhaul methods as well as a considerable increase in expenditures.

At the same time repair and overhaul capabilities will be limited due to a decrease in allocations connected with current measures involving reduction of the USSR Armed Forces and decrease in defense spending. Consequently a detailed analysis of the technological level of production, the social base, economic indices and financial state, with the aim of economical expenditure of the state's resources, should become the principal focal area in the activities of the Air Force's aircraft overhaul depots and rework facilities.

I should note in conclusion that operating on full economic accountability is not an end in itself for us but rather a tool with the aid of which the tasks of ensuring Air Force operational readiness will be accomplished.

Importance of Detailed Understanding of Factors Causing Pilot Error

91441413e Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 12-13

[Article, published under the heading "Flight Safety: Experience, Analysis, Problems," by Military Pilot-Expert Marksman Col L. Kovrizhkin, combined unit senior flight instructor: "These Nontrivial Trivialities"]

[Text] The bomber was on autopilot at 8,600 meters with 380 km/h indicated. Shortly after commencing a banked turn to the left, it suddenly and without warning pitched violently down into a negative G-force left banking dive. The situation was critical. Taking less than 2 seconds to respond, aircraft commander Maj V. Vasilyev disengaged the autopilot, ordered the copilot to reduce throttle setting to idle, and initiated dive recovery.

Four seconds into the dive, the aircraft had descended to 8,500 meters and the dive angle had reached 17 degrees. Airspeed was building up, causing the aircraft to resist dive recovery efforts. Forces on the control yoke exceeding 100 kg. Six seconds into the dive, the aircraft commander ordered: "Help me pull the yoke!"

The senior radio operator, the flight engineer and the navigator proceeded to assist the pilot and copilot. As the aircraft approached limit airspeed, however, dive recovery became more difficult.

Eighteen seconds into the dive, the aircraft rolled from a left wing down to a 39 degree right wing down attitude. One second later the aircraft, with right wing down and at a 36 degree dive angle, plunged into clouds. The horizon disappeared, and a dark shroud covered the cockpit glass. The pilots were left with their instruments, their knowledge and experience.

The crew was put to a most difficult test of proficiency in this grave, swiftly-moving and rapidly-changing situation. Thirty-five seconds into the dive, the pilots, applying aftward pressure on the elevator trim control, finally succeeded in bringing the aircraft back to level flight. This was accomplished at an altitude of 5,250 meters. Vasilyev had needed only 35 seconds in order mentally to "leaf through" the manual, to perform optimal procedures, and to accomplish dive recovery.

Life has a tendency to keep reminding us that regardless of degree of system redundancy, no matter how reliable the engines and other vital aircraft components may be, nevertheless every flight potentially involves a certain risk and all kinds of unexpected occurrences. The pilot must prepare on the ground for such occurrences, using every resource at his command, including training simulator equipment.

During my years in the military it has been demonstrated to me time and again that flying modern aircraft demands that aviators possess thorough knowledge of theory and solid flying skills and that it is simply impossible to fly an aircraft flawlessly without precision mastery of a great many procedures. An understanding of the process of flight training enables a pilot closely to monitor training progress, to influence it, and consciously to improve the quality of his flying as he gradually masters the aircraft and acquires experience. This is discussed so frequently that one would think that all flight personnel would have long ago drawn the appropriate conclusions. However....

Maj V. Lazuchkin had logged hundreds of hours on the combat jet aircraft. He had a 1st class rating. He certainly was up to the job of practicing flying technique in the practice area with one engine throttled back. In addition, the good weather ruled out any complications

on that score. Lazuchkin was surely confident of success when he proceeded to perform the prescribed maneuver sequence.

But the engine suddenly died when he throttled back to idle. He radioed to the flight operations officer, concern in his voice: "I am in the practice area; I have an engine out.... How shall I proceed?"

By decision of the flight operations officer, the aircraft was cleared for immediate approach and vectored to a final approach course. The pilot landed safely on one engine. The flight data recorder tape indicated that there was no mechanical problem. The pilot, when he throttled back to idle, had gone past the detent into the engine shutdown setting. Unable to grasp his error, he had assumed that the engine had simply died, and he made no attempt to perform an airstart.

Following analysis of the circumstances of the mishap-threatening incident (PLP), the regimental commander wrote in his report to the higher echelon: "Cause of the PLP: pilot error consisting in unintentional engine shutdown. Measures taken: analysis of the incident with flight personnel; additional training session on throttle procedures." The discussion should have begun with this.

I am sure that some pilots will accuse me of unnecessarily emphasizing trivialities. Who needs a practice session on moving the throttle back and forth! I am going to ignore the criticism, however, since it is precisely these minor, trivial items which give rise to air mishaps and mishap-threatening situations.

I simply cannot comprehend the reasoning of pilots who question the appropriateness or utility of a practice session, particularly on the simulator. They present various arguments in support of their position. The following is the most commonly heard: a cockpit simulator cannot substitute for an aircraft in the air, since it fails to provide a complete sensation of flight. It is true that the flight simulator is not an airplane. But this is not a vital point! The main thing is to gain confidence with the assistance of the simulator, to test one's response in abnormal or emergency situations, particularly when one is preparing to fly at level one weather minimums.

Sometimes the importance of rehearsing cockpit procedures in the actual aircraft cockpit is also underappreciated; some feel that it is an anachronism. In my opinion the ones at fault here are commanders who themselves fail to grasp the importance of such practice sessions.

Once I asked a flight commander during a cockpit procedures training session: "What plan and procedure are you following?"

He replied: "No plan. I ask the pilots questions they do not understand, and they reply...."

Yes, that is what he said—"questions they do not understand." Is it surprising that the pilots had a sour look on their faces and were clearly anxious for this useless exercise to end. I am not laying fault with the flight commander, since nobody had taught him a proper instruction method.

I had to explain to him that a checklist card should be prepared for a specific flight assignment, presenting the specific features of execution of the specific flight assignment. A practice session should also definitely include in-flight emergencies, and practice drills involving the most important emergency-response items should be held with each pilot in each calendar month.

A drill session could be held as follows, for example. The flight commander asks the pilot a question or presents a scenario, after which the pilot gives a response, and the flight commander checks the pilot's actions. Depending on the nature of the question (scenario), the pilot presents his decision or solution in the form of a narrative accompanied by practical demonstration. As he listens to and observes his subordinate, the commander can suggest specific actions and demonstrate their proper execution. The task consists in ensuring that the pilot develops correct, solid skills in operating the aircraft and its equipment during the performance of a specific flight maneuver sequence and that he learns quickly to assess a situation change and to make an optimal decision.

An important phase of the work by flight and squadron commanders to ensure flight safety is detailed and comprehensive study of errors by flight personnel and the taking of specific measures to eliminate the causes of these pilot errors. The commander must be aware of the fact that erroneous actions in performing cockpit procedures are determined in large measure by each pilot's individual peculiarities. These include faulty distribution and switching of attention, inadequate short-term memory, emotional instability, delayed reaction, excessive haste in decisions and actions, an uncritical attitude toward one's mistakes, and excessive self-confidence. The commander should realize that pilots make mistakes for reasons other than carelessness. Who is going to deliberately place himself in peril? A frequent factor is a fast pace of required cockpit actions with limited available time, complexity of cockpit equipment, maneuver sequences, etc. The commander should bear in mind primarily the individual characteristics of each pilot in structuring the training process and in conducting efforts to prevent air mishaps.

High Accident Rate at Air-to-Ground Ranges

91441413f Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) p 13

[Article by Air Force Flight Safety Service: "Dangerous Situations During Weapons Delivery at Air-to-Ground Ranges"]

[Text] The process of ensuring flight safety, which includes analysis of figures on frequency of the most typical in-flight emergencies and air mishaps, reaching

validated conclusions on this basis and implementing these conclusions, should constitute a purpose-directed process and should be transformed from general appeals into particular, specific methods. One of the applied ways to achieve such specificity in preventing fatal air crashes and air mishaps is to perform differentiation of accident analysis and prevention in different categories of training sortie.

In spite of the great diversity of forms and methods of combat training in the various component organizations of the Air Force, the specific features of an aircraft's mission tasking function and employment, there exist so-called common "hot" spots as regards the state of flight safety. These include air mishaps at air-to-ground ranges during live firing and tactical employment of fixed-wing and rotary-wing aircraft armament.

At no other phase of a flight, with the possible exception of takeoff and landing, do accident statistics show such a systematic repetition of the same source causes of hazardous situations and adverse outcomes (as regards circumstances and place of occurrence, dynamics and swift development of events) as at the range.

Failure adequately to consider, and particularly ignoring of these present-day realities is greatly complicating efforts to prevent oversights and errors of omission during preparation for flight operations, during execution and control of flight operations, and in observing the requirements of regulations and accident-prevention recommendations. This results in fatal consequences in the form of air tragedies and mishaps which occur each year, incidents which occur at different ranges from similar causes.

Analysis of data covering a substantial period of time indicates that the majority of in-flight emergencies and air mishaps during combat flying involve two groups of factors: stalling (with spin entry) during range approach maneuver or during maneuver to a specific target, as well as during breakaway after completion of the attack pass; collision between fixed-wing or rotary-wing aircraft, collision with the ground (water surface) in the range area, or strikes by munitions fragments and birds.

Cases of stalling out at air-to-ground ranges are not always identical to one another in various types of flights, especially when practicing flying technique in practice areas. There each maneuver element constitutes for the pilot an end in itself, as it were, the object of total attention concentration. At the range a quite different motivation predominates—to reach the target run initiation point with precision in all parameters, and after that, on final target heading, to score an accurate hit on the target. This increases the stress and work loading on the pilot, especially in a maneuvering single-seat aircraft.

The probability that principal causes of stalling will occur—failure to coordinate a turn, failure to observe operating restrictions and, particularly, dropping below minimum controllable airspeed—increases substantially in instrument meteorological conditions, when flying at night, as well as during poor visibility and with poor target identification, when there is heavy air traffic at the range, and as a consequence a hasty, poorly-considered command by the range officer.

In such a situation (when several negative factors come together), even experienced pilots who have not flown a range sortie for some time have gotten into stall conditions.

Of course one cannot reduce the entire causality of stall occurrence at air-to-ground ranges solely to pilot errors in flying technique and attention distribution. In many instances these errors were a consequence of deficiencies in organization and control of flight operations during exercises and when coordinating with other force organizations, oversights and omissions in drawing up range procedures and regulations, limited capabilities of range target and electronic facilities, and weapons aiming and targeting system failures.

Nevertheless, with various combinations of these cause-and-effect linkages, a negative outcome to a specific incident has as a rule been helped along by a wrong decision by the pilot. Disinclination to request another run on the target, fear of bringing back an unreleased bomb, an endeavor to work over a target at all costs, regardless of a sharp deterioration of weather conditions, etc, push back to a position of secondary importance such factors as a lack of professional due caution and good sense. Often mistakes occur in the process of turning to final target heading.

Delay by pilots in making and executing the decision to eject when stall recovery efforts fail, even though there is little altitude and time to spare in order to eject successfully, is also highly typical. This is precisely what happened recently when a MiG-29 fighter, flown by a deputy squadron commander, stalled while turning to final target heading.

Collision of fixed-wing or rotary-wing aircraft above the range, colliding with the ground or water surface, as well as being hit by munitions fragments have an even more clearly-marked personal or individual causality. In almost all cases they have been the result of failure to observe proper formation flying procedures, failure to maintain altitude (profile) on final target heading, as well as a consequence of maneuver following ordnance delivery.

At the same time one should not forget that it is precisely during these phases of a range sortie that the aircrew's attention is the busiest, in several different directions simultaneously: aiming, monitoring flight parameters and configuration, checking weapon systems, and keeping an eye on the location of the adjacent aircraft (helicopter). For this reason any delay in reporting a deviation from the established sequence of actions (loss of element leader, loss of radar lock, discovery of aiming error, etc.) can result in the most grave consequences.

For the most part collisions with the ground (water surface) at the range are a consequence of errors in figuring altitude and in monitoring descent to a specified height agl. This is helped along by the fact that some pilots make limited use of ground-proximity and low-altitude warning devices, altimeters and vertical measuring equipment. The hazard of such situations has also been heightened by delay in initiating descent and descent at an excessive dive angle. Range officers are not always able to avert a pilot error by giving the needed command, due to the lack of sophistication of means of monitoring aircraft height on final target heading.

Fixed-wing and rotary-wing aircraft have been struck by fragments of munitions (their own or the element leader's) only when employing live munitions, that is, as a rule during tactical exercises. They have been the result of failure to observe the prescribed mission configuration (height and target departure maneuver), spacing between aircraft, as well as the prescribed altitude difference above other aircraft in formation.

Consideration of these general data in combination with the specific requirements of each type of aircraft system and specific range will make it possible not only to increase the probability of successful weapons delivery by aircrews in all Air Force component organizations but also to avoid unwarranted losses.

Critical Problem of Preventing Military Aircraft Accidents

91441413g Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 14-15

[Article, published under the heading "Flight Safety: Experience, Analysis, Problems," by Col V. Dudin, Air Force Flight Safety Service inspector, candidate of military sciences: "The Accident Could Have Been Prevented"]

[Text] The combat trainer had turned to final approach heading. It was being flown by experienced 1st class pilots. The officer in the front seat was just in the process of mastering this aircraft, it is true, but the instructor had logged considerable time in type.

Weather was VFR. Air traffic and radio communications were light. They were about two minutes out on final approach. There did not appear to be anything hindering a normal landing. Nevertheless an aircraft which was in fact in good working order stalled out on final landing approach....

A hazardous situation began to develop when a warning light came on, indicating a fire in one of the engines. Initial response procedures were normal. The operating manual covers in detail the procedures a pilot is to follow in such a situation. Procedures call for the pilot to determine on the basis of other indications whether or not a fire is in fact present, and to make the decision whether or not to shut down the engine and continue the landing approach on one engine.

Poor response by the pilots in question, however, pushed events down a critical path. After the annunciator panel warning light flashed on, they altered the throttle setting not just on one but on both engines. This led to a loss of airspeed and lift. This was followed by another error: the student pilot raised flaps, as a result of which the aircraft entered a stall near the middle marker.

The pilots were late in making the decision to eject, when the aircraft was at a steep angle of bank. Both sustained fatal injuries. Thus a faulty engine fire warning light and the fact that subsequently the pilots made one mistake after another in cockpit procedures resulted in what was at first an uncritical situation developing into a tragic outcome. Fatal aircraft accidents are the gravest consequence of failure to observe correct procedures. They constitute not only a defect engendered by insufficient pilot professional skill but are also a social phenomenon.

Logic would suggest that the requirements of flight safety should be a focus of concern by all persons involved to one degree or another in organizing flight safety. Unfortunately this frequently does not match the true state of affairs. The command element of some units and subunits frequently calls on flight personnel to ensure flight safety, while not backing up their words with specific preventive measures aimed primarily at preventing fatalities. One still notes the same attitude toward fatal accidents as, for example, toward minor mishaps and equipment failures. Emphasis in accident investigation is placed on a statistical, fact-listing approach, without considering the individual psychophysiological peculiarities and conditions of the daily life and activities of each pilot.

It is not mere happenstance that narrowing the cause-and-effect linkages of an accident under investigation to a single cause and determination of a single guilty party, as a rule the individual who is buried under the wreckage of the aircraft, has become deep-rooted. It is much simpler to draw up a formal statement of inquiry and issue an appropriate order. But the principle "without a human operator there would be no problems" is not valid for preventive work in aviation.

The flawed, limited nature of such a single-cause approach can be seen by examining, for example, the materials from an investigation of collisions between aircraft and the terrain during a landing approach to an airfield in mountain terrain. In most cases either the crew (error in figuring altitude, in setting the altimeter, in determining distance to the field, etc) or the tower controllers (giving instructions to descend without the aircraft being visible on radar, mixing up radar returns and callsigns, errors in giving the airfield's altimeter setting) are determined to be to blame. The actual dynamics of each such incident, however, consist in a combination of these factors and in the fact that an error by one of the parties is aggravated by the fact that there

is inadequate backup verification of the other party's actions as well as a lax attitude by that party. At the same time active, aggressive efforts by the aircrew and tower controller team make it possible to determine an error and interrupt the process of development into a disaster situation.

Practical efforts to determine the sole person directly responsible for an air mishap help eradicate an attitude of total dependence and passive behavior on the part of many officials, aircrews, air traffic controllers, and specialist personnel of supporting subunits. They often blindly rely on one another, resulting in failure fully to utilize airborne and ground means of ensuring flight safety. Pilots, for example, do not always use their ground-proximity and below minimum safe altitude warning systems, are lax about checking pressure altimeter readings against their radar altimeter, and do a poor job of verifying their actual location against the approach chart or approach plate.

In many units the tower controllers in turn frequently fail to make use of available methods of checking and verifying an aircraft's current location and altitude. They fail to cross-compare the readings of radars operating in different bands, and they fail to switch on navigation data display and precision approach radar altitude display, which shows the aircraft's actual (which may differ from reported) height above ground level. Secondary radar modes and instrument interrogation capabilities are little used.

These and other procedures, which on the one hand constitute fairly effective preventive measures and on the other hand (when ignored) constitute sources of occurrence of emergency situations, are available to all flight and ground services. Results are determined solely by how intelligently they are utilized. At the same time the practical experience of accident investigation indicates that analysis of accidents (particularly fatal accidents) solely on the basis of such factors as deficiencies in organization of flight operations shifts and air traffic control, errors in flying technique or aircraft operation, and indiscipline is to the benefit primarily of gathering statistics. Such a method produces little benefit, however, as regards preventing air mishaps, since it does a poor job of determining the full picture of complicated air accidents.

It has long been known that in-flight difficulties which lead to tragic results can arise for various reasons but have identical manifestations. An engine may fail, for example, as a result of design or manufacturing flaws, as a consequence of poor maintenance by aviation engineer service personnel, due to substandard fuel, or as a result of an error by crew members in engine operation. Or take a potential collision situation involving aircraft approaching head-on or on an intersecting path. This can happen due to an error by air traffic controllers, due to an oversight by crew members, or as a result of equipment failure.... In order to neutralize dangerous consequences it is important vigorously to take the necessary measures in each of these areas, taking into account flight phase, airspeed, altitude, flying weight, and maneuver capability.

A thorough, substantive analysis of air mishaps will make it possible to apply preventive modeling of the most common hazard situations, which in turn will help us more fully clarify the mechanism of their occurrence and development and correspondingly will make it possible to place a barrier at each phase in the form of countering actions both by aircrew and personnel of other services.

Comparison of such models (according to specific features and types of incidents) is certainly a complicated and critically important undertaking. Descriptions of in-flight emergencies contained in flight operation guideline documents for specific types of aircraft can serve as a prototype for such studies. I emphasize, however, that this would be only as a prototype, since these documents describe primarily actions in response to in-flight emergencies. But this narrows the picture of what takes place during an actual flight, where it is important first and foremost to prevent the occurrence of an emergency situation. In addition, virtually all described in-flight emergencies are presented as a consequence of equipment failure or deterioration of external conditions to the flight. They do not touch upon the human factor: mistakes by flight personnel, air traffic controllers, or aircraft maintenance personnel. And yet such causes are much more common than straightforward equipment failure.

It is my view that in order to make it easier to study and process data it makes sense to present a typical emergency situation on a separate card and not only in a collected volume of incidents as is being done at present. Specialists from the various services—flight safety, combat training services of the various Air Force component organizations, aviation engineer service, as well as psychologists should take part in preparing and completing the proposed models. Subjectivity in this undertaking can result in a repetition of tragedies.

Showing the way to prevent getting into a dangerous situation (stalling, descent below safe altitude, approaching dangerously close to another aircraft, being struck by munition fragments, etc), both involving objective and subjective factors, is an optimal principle of structuring the materials of a preventive accident model. One should take into consideration the specific features of preventing fatal mishaps within a specific Air Force component and even with a specific type of fixed-wing or rotary-wing aircraft. For example, while the probability of a safe outcome remains high for a highly-maneuverable single-seat aircraft even in a difficult situation (using the horizon to return to a straight and level attitude, violent maneuver with afterburner and, lastly, ejection), avoiding even coming close to a hazardous configuration is the best preventive medicine to keep a large, heavy aircraft out of danger.

This applies in particular to crews hauling passengers. Carelessness, complacency, lack of controls and restraints, and a complacent attitude toward established restrictions can have the gravest consequences. This is confirmed by a fatal crash by a Navy Tu-104 during takeoff. The crash was a consequence of several factors involving failure to observe proper procedures: the aircraft exceeded maximum gross weight, the weight and balance configuration was incorrect, airspeed at liftoff was too low, the takeoff roll was too short, and the pilot failed to compensate for the crosswind. Each individual violation of procedure was minor, but the aggregate combination proved fatal.

The cause of preventing serious air mishaps could be greatly assisted with centralized publishing of easy-to-understand graphic materials presenting the stages of inception and processes of development of emergency situations: these could include fictionalized films showing the circumstances of occurrence of adverse situations from the pilot's vantage point. What instrument readings does he see? To what does he pay attention and what does he fail to notice? How does he report and what does he report to his ground controllers? How does he manipulate the cockpit controls? Wherein do his mistakes lie and how should he have proceeded? I feel sure that viewing such a film in a special training session would be more useful than a two-hour lecture.

Unfortunately at the present time the flight safety service is unable adequately to perform such tasks. It has neither the appropriate specialist personnel nor requisite equipment for this area of endeavor. It is high time to give some thought to this matter, for prevention of even one fatal accident is of priceless benefit, since the most precious thing—human lives—is saved.

Interethnic Relations Stressed at Political Section Meeting

91441413h Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) p 16

[Article, published under the heading "Party Affairs: Progress With Perestroyka," by political section officer Lt Col N. Kotseruba: "...But Responsibility Is Individual"]

[Text] In the year which has passed since the 19th All-Union CPSU Conference, considerable changes have taken place in the thinking and actions of party members and in the activities of many party organizations of our units and subunits. First of all they have proceeded to face problems and genuinely to work with people.

Recently the unit party committee headed by secretary Maj A. Bushmanov was presenting a report in our political section. The subject of discussion was problems of internationalist indoctrination of Air Force personnel. It was not any kind of new or novel event, but its unusualness lay in the fact that not just the secretary but the entire party committee was being subjected to accountability. Each member of this elected party body had to answer not only for overall results but also for his own individual contribution to this important undertaking. In addition, the report was presented in the presence of and with the active participation of the party committee and bureau secretaries of other units. This greatly increased the significance of discussion of such an important area of party committee activity as implementation of the 19th All-Union CPSU Conference decision dealing with interethnic relations.

In the course of the presentation it was noted that the party committee, working jointly with the command authorities, was vigorously seeking new approaches, methods and means of accomplishing the party-assigned task to emphasize improving qualitative parameters of combat training of the subunits and the unit as a whole. One sure way to accomplish this task is to achieve cohesiveness of the multiethnic military collectives and creation of an atmosphere of trust and respect.

Personnel of 15 different ethnic affiliations are currently serving with this unit. It is difficult for experience-lacking commanders and political workers to conduct indoctrination work in such collectives. The party committee organizes various ideological measures to assist them.

Exhibits of special literature are regularly set up at the library and in the methodology room, and conferences on theory and methods as well as reader conferences are held.

The unit's party members skillfully utilize in internationalist indoctrination political instruction classes and political briefing sessions on the affairs and achievements of the union republics and various regions of our country, get-togethers with war and labor veterans, veterans of the Armed Forces, and with representatives of various nationalities and ethnic groups in the Soviet Union. Special evening activities and morning activity events are held, as well as oral newsmagazine sessions and readings of newspaper columns dedicated to the topics of friendship and brotherhood among the peoples of the USSR and discussion of their customs and traditions.

In oral propaganda and graphic agitation materials, considerable attention is devoted to well-reasoned exposure of the fabrications of bourgeois falsifiers in the areas of CPSU nationalities policy.

On the whole this work produces good results: military collectives have become more cohesive, and discipline has strengthened. And, most important, unit combat readiness has risen to a new and higher level.

This was discussed in the reports presented by party committee secretary Maj A. Bushmanov, party body elected members officers A. Goroshko, V. Kovalchuk, and V. Sysoyev, plus others.

As was noted at the meeting, however, the reports failed to contain the main thing: a statement of each individual's personal contribution to the cause of improving internationalist indoctrination of Air Force personnel. For this reason they had to answer questions from the audience, asked by party activists from other units and political section officers. And this proved to be a difficult task for some. It was necessary to give an account, however, for it is said for good reason that the task is in common, but responsibility is personal and individual.

Both secretary Maj A. Bushmanov and his deputy for ideological work, Maj A. Goroshko, felt uncomfortable. The reason for this was the fact that the party committee and subunit party organizations had been slow about setting up a specific, smoothly-running system of actions to implement the CPSU All-Union Conference resolution entitled "On Interethnic Relations" and had failed to designate this problem as a priority area in the activities of all party organizations and of each party member.

The secretary and party committee members, including Comrade V. Kovalchuk and V. Sysoyev, had not succeeded in ensuring that matters pertaining to improving interethnic relations, patriotic and internationalist indoctrination were regularly discussed in the subunit party organizations. Presentation to the party committee of reports by leader-Communists on their place and role in restructuring of indoctrination work had not been firmly incorporated into regular practices.

At times some party committee members are unable thoroughly to analyze the true state of affairs pertaining to a given issue, and this means that they are not always prepared to dig into the reasons for various trends or to make competent and timely decisions.

The party committee members also agreed that the party organization lacks strict party accountability from party members responsible for organization of ideological activity and its internationalist thrust.

On the whole the discussion was both useful and incisive. Both the members of the performance-reporting elected party body and the party organization secretaries who had been invited to attend this meeting came to a unanimous conclusion: a number of basic elements should be emphasized in carrying out restructuring of the work style of the party committees and party bureaus pertaining to internationalist indoctrination. First of all it is essential precisely to define the responsibility of each party member for a specific area of internationalist indoctrination of personnel. Second, efforts should be concentrated on practical organization of things in the military collective within the subunits. Third, emphasis should be placed on individual indoctrination work with personnel, and one should be familiar with the true state of affairs and moral atmosphere in each multiethnic collective.

At this same meeting they jointly drew up practical work recommendations. These recommendations are now being implemented. Many party committees and party bureaus, for example, have formed interethnic relations working groups. They contain the most highly-trained leader-Communists, political workers, officers from the various services, teachers, etc. The main purpose of their activities is to synthesize and disseminate advanced know-how, to study various trends in the moral climate of multiethnic military collectives, and to draw up recommendations on strengthening party influence on achieving genuine positive results in combat and political training and in strengthening military discipline.

In order that these groups not become lip-service adjuncts to the party administrative apparatus, their activities are periodically analyzed, and party member reports are presented to party organizations and military collectives.

In many collectives, including the unit with which Maj A. Bushmanov serves, they are now holding more strictly to account those CPSU members who have been assigned the task of dealing directly with organizing and conducting personnel political training. More and more party members are being given party assignments to conduct mass-political activities pertaining to internationalist indoctrination and to conduct individual indoctrination work with military personnel of different nationalities and ethnic affiliation in order to give them specific help in their professional development, in assimilating political knowledge, and in mastering their military occupational specialty.

Nevertheless we cannot be entirely satisfied with practical work aimed at enhancing the vanguard role of CPSU members and their personal responsibility for the assigned task. Even the finest recommendations are worthless if the inertia of the period of stagnation continuous to hold sway in some party organizations. It is primarily the elected party bodies which are called upon to pull them out of this state. Of course the work form we have proposed is not the only possible one. But it convinces us of the need for extensive innovative search and aggressive actions.

Importance of Quick-Check Area Aircraft Inspection Stressed

91441413i Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 18-19

[Article, published under the heading "Advanced Know-How Put Into Practice by Aviation Engineer Service," by Capt A. Kondratyev, detachment aircraft maintenance unit chief, master rating: "Stop Prior to Departure"]

[Text] The aircraft proceeded to taxi toward the active. It braked to a stop by the technical inspection post [quick-check area]: it had to be walkaround-inspected before taking off. The station was manned by a team of experienced maintenance specialists. Sr Lt A. Korobkov and

WOs A. Mironov and S. Shcheglov carefully inspected the aircraft, observing all safety precautions. Convinced that everything was in order, the quick-check inspectors backed away from the aircraft, and the inspection station OIC, pointing with his left hand in the direction of the active, signaled permission to proceed. The pilot smoothly advanced the throttles and taxied onto the runup pad....

Today, with increased demands on quality and efficiency of flight operations, a particularly important role is played by aircraft inspection just prior to departure. Maintenance personnel who know the aircraft well and are familiar with the details of an aircraft's operation and maintenance in various weather conditions are assigned to the quick-check area inspection station. They must quickly determine that there is no skin damage on the aircraft, that all wheel well doors are correctly positioned, that all hatches and inspection covers are buttoned up, that all protective covers and caps have been removed, that there are no fuel or oil leaks, that no air leakage is occurring, that control surface deflections are properly synchronized, that antennas and static discharge wicks are in normal condition, plus many other items. Only experienced aviation engineer service specialist personnel familiar with the "weak points" of a given type of aircraft are capable of doing a quality job with such an extensive inspection. This is why we assign precisely such individuals to quick-check inspection duty. This produces results. It is in large measure due to their alertness and vigilance that for more than 3 years now we have had no mishap-threatening incidents through the fault of engineer-technician personnel.

I would like to mention the names of Air Force personnel who always have a conscientious attitude toward their duties. They include Capt A. Kovalev, Sr Lt A. Korobkov, and WOs A. Mironov and S. Shcheglov. They are high proficiency-rated maintenance specialists with a wealth of experience in servicing aircraft. They have never been the target of complaints pertaining to standing duty at this important station.

It is a fact, however, that some airmen have an insufficiently strong feeling of responsibility toward quick-check area duty and consider such duty to be of limited usefulness. Their reasoning is as follows: aircraft are preflighted by experienced maintenance specialists, who have plenty of time to perform preflighting procedures. Their actions are monitored by their superiors, each of whom, by signing the aircraft preflight log, guarantees that all aircraft systems will operate reliably and without malfunction. And what can a quick-check area duty man really spot in the few minutes he has to make his inspection? Is it really worthwhile to take airmen away from their regular duties?

I do not believe that there is any need to argue that this opinion is erroneous. Quick-check area duty personnel have on numerous occasions prevented serious conditions which would have led to in-flight emergencies. Let us recall the following incident.

It seemed that the ground maintenance people had not overlooked a single thing in preflighting a certain aircraft. It was time for departure. All that remained was to pass inspection with the quick-check area people. But the aircraft did not take off on this occasion. A standby aircraft took its place.... The fact is that the quick-check area duty maintenance people spotted a crack on the nose gear torsion link. One can imagine the consequences if the aircraft had been allowed to take off.

This example attests to the fact that nobody is guaranteed against mistakes or unforeseen situations: neither veteran maintenance specialists nor the younger and more inexperienced personnel, and particularly the latter. For this reason flight operations require constant inspection and reliable backup. And the aircrew also feels better when the "thumbs-up" is given by a quick-check area inspection team performing its duties in a professional manner. Most of our maintenance people are conscientious. These include WO A. Mironov, who spotted a loose nut on a yoke rocker arm attachment assembly, which averted nose gear control system failure. Equally proficient is WO S. Shcheglov, who spotted a sheared nose gear turning mechanism hydraulic cylinder attachment bolt.

Nevertheless each time the flight operations senior engineer briefs the quick-check area duty men, he emphasizes safety procedures and lists in detail what their inspections are to include, what previous deficiencies must be borne in mind, and reminds them of the need for constant technical alertness and conscientiousness. All this of course is done not for the sake of carrying out a required procedure but in order to stress the importance of the job being done by the quick-check area duty people.

It does not happen often, but unfortunately it does sometimes occur that the technical inspection post detail makes mistakes and causes disruption of the smooth rhythm of flight operations. One duty man, for example, fearing that he will make a mistake, inspects aircraft more slowly than prescribed, while another is excessively self-confident and is too hasty in his inspections. Sometimes aircraft are returned to the ramp not because some problem has been spotted but rather due to poor knowledge of aircraft maintenance details and unskilled determination of the nature of observed symptoms.

Once the quick-check area OIC decided not to allow an aircraft to proceed to the runup pad. He felt that there was an indication of a fuel leak on one of the engines. In actual fact there was no leak.

Of course if an inspecting maintenance man has the slightest doubt, it is better to return an aircraft to the preflighting area to check out the possible problem. But this should be done only when warranted, because when he delays an aircraft by 15 or 20 minutes, the quick-check area OIC is disrupting the flight operations schedule, which can lead to failure to complete scheduled flight operations.

In order to prevent such occurrences, our unit's aviation engineer service supervisory personnel devote constant attention to improving procedures at technical inspection stations. Their performance is regularly assessed when summarizing the results of flight operations and at technical critique and analysis sessions. The experience and know-how of top performers is widely disseminated in our unit, and the best airmen are commended.

Briefings on safety measures, on the specific features of aircraft inspection, as well as specialized training classes and drills, which are regularly held on aircraft maintenance days and on flight operations preparation days, in the course of which "malfunctions" are introduced on an aircraft to be inspected, are quite beneficial. The airman performing the role of quick-check area duty man must spot such "malfunctions" and make a decision as quickly as possible. This is always followed by a critique and analysis session, during which mistakes made by maintenance personnel during the drill are analyzed.

The technical inspection post is a very important aviation engineer service element in organizing inspection and verification of the operating condition of aircraft during flight operations. The greater the sense of responsibility of those persons assigned to this job, the greater will be the guarantee of mishap-free flight operations.

Airfield Concrete Surface Deterioration Affecting Aircraft Engine Longevity

91441413j Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 18-19

[Article, published under the heading "Innovations in Airfield Maintenance," by Col G. Bobrov: "Reliability Reserve Potential"]

[Text] The equipping of Air Force units with combat aircraft powered by high-thrust and high-airflow turbine engines has made the problem of accelerated-schedule engine takedown one of the most acute problems in military aviation.

This problem arose virtually simultaneously with the development of jet aircraft, but in comparison with other matters did not seem to be such a difficult issue. It is perhaps for this reason that its resolution was given a lower priority.

The modern aircraft, which has higher demands regarding cleanness and smoothness of airfield surfaces, at the same time is the principal source of deterioration of airfield surfaces: it generates considerable static and dynamic stress loads, jet exhaust gas pressures, and temperature gradients.... Nor do the large areas of man-made surface, high-intensity flight operations, and seasonal restrictions on performing preventive maintenance work help improve the quality of solving this problem.

We place considerable hopes on adoption of new engineering solutions. But this unfortunately is a thing of the future. Only initial steps have been taken in this direction in Soviet aircraft engineering: two fourth-generation military aircraft carry ancillary top-mounted air intakes, which operate jointly with the primary intakes.

New grades of high-strength concrete, capable of withstanding heavy operational stress loads for an extended period of time, are also not yet in widespread use in airfield construction.

Improvement of operational and maintenance procedures by Air Force unit command authorities and all unit personnel, directed toward high-quality preparation of airfield surfaces for flight operations, prompt and timely cleaning of airfield surfaces, and improved organization of flight operations shifts are a practical and, as is indicated by the experience of vanguard units, a reliable way to achieve today a reduction in the premature need for removal and repair of jet engines.

Development and adoption of procedures of preflight-operations preparation of airfields, methods of inspecting the condition of airfield services in the course of flight operations, and rigorous scheduling of performance of airfield surface repairs have helped make this work more effective.

Of considerable importance have been efforts by specialists in the Air Force, at scientific research institutes and in the industrial ministries to implement an aggregate of research and development projects aimed at developing new vehicles and equipment to provide care and maintenance of airfield surfaces and preparation of airfield surfaces for flight operations. The Progrev truck-mounted jet engine for melting runway ice, for example, the Lider screw-conveyer rotary snowplow, and the Ozon vacuum-cleaner truck have successfully completed factory and government testing and have gone into regular production. The Universal sweeper vehicle, which is capable of performing the functions of currently-existing airport maintenance vehicles, is ready to enter production.

New airfield maintenance equipment entering service has greater output (by a factor of 1.5) and offers operating personnel a comfortable working environment. Many are equipped with two-way radios and flashing or rotating beacons, which provide reliable communications and make them highly visible.

Scientific research and design organizations of the Ministry of Defense, the USSR Academy of Sciences, and industry, with the active involvement of Air Force rear services specialist personnel, are conducting a successful search for more advanced methods and means of operational maintenance and minor repair of airfield surfaces. For example, it is planned to obtain stronger concrete in the surface layer by providing a thin protective layer of polymer concrete, as well as by impregnation with pore-sealing and hydrophobic compounds.

Synthetic resins dissolved in organic solvents are considered to be the most promising materials for these uses.

Extensive adoption of scientific advances in airfield construction and operational maintenance is another principal direction being taken toward solving the problem of reducing the incidence of premature engine takedown due to the ingestion of foreign objects.

Rear services specialist personnel, however, should play a leading role in providing a high-quality takeoff and landing surface.

The spring-summer period is a very critical time of year for rear services personnel. As a rule it is during this time that many complex, imperceptible changes take place in the base area of man-made surfaces, changes connected with ground thawing and excessive soil moisture. During taxiing, as well as during the initial part of the takeoff roll and in the final phase of rollout, when little lift is generated, aircraft generate vibrational pulses in taxiway and runway surfaces. Resonance can occur, which leads to intensive deterioration of runways and taxiways. It is not mere happenstance that premature takedown of aircraft engines due to ingestion of concrete surface deterioration materials increases sharply in the spring and fall.

In addition, water or extremely wet sand base (so-called pulp) forces filler out from the joints between concrete slabs as aircraft roll across them. When fountaining occurs, material can be ingested by the aircraft engines. In order to prevent this, when it becomes excessively wet at the base of the concrete slabs, one must determine the cause and take immediate steps to correct the problem. When necessary, gross weight restrictions should be placed on aircraft operating at the airfield in question, and in some cases the airfield should be closed down.

These are extreme measures, but in some instances (when the water-saturated base loses its load-bearing capability) they are mandatory in order to ensure flight safety and to prevent premature aircraft engine takedown for repair.

A number of highly effective repair materials are presently available, and line units are being supplied in sufficient quantity. These include RBV-25, RBV-35, and Gissar rubberized-asphalt binding agents, synthetic resins, and various compounds based on these agents.

All cracks, sites where chipping or shearing/spalling has occurred, and joints, when repaired with RBV mastic materials, should first be cleaned and a primer applied (RBV dissolved in gasoline or jet fuel). All preparatory operations should be performed thoroughly and well, and the prescribed process should be rigorously followed. It is recommended that epoxy glues and epoxy-glue-based epoxy-mineral mixtures be used to fill in cracks and potholes, to repair slab edges and joints, and to build up a protective overlayer mat on concrete surfaces.

All our airfield technical subunits are provided with vehicles and equipment which enable them to prepare airfields for flight operations in a prompt and timely manner at any time of the year, day and night, in any region. But here is a puzzling fact. Powered equipment availability is virtually the same in all units, the condition of airfields is the same on the average, and yet the number of aircraft engines removed prematurely due to ingestion of foreign objects varies greatly. What is the reason for this? It is obvious. We are dealing with differing effectiveness and promptness in performing the appropriate preventive procedures.

The large strategic formation with which officer N. Ptushka served as rear services chief until recently can serve as a graphic illustration of the consequences of relaxation of demandingness and diminished effectiveness of measures aimed at preventing aircraft engine failures. In the past two or three engines would fail prematurely each year. Subsequently preventive efforts were neglected, the quality of preparation of airfields for flight operations deteriorated, and instances of premature aircraft engine failure were investigated in a lip-service manner. Results were immediate: the number of premature removals of aircraft engines due to ingestion of foreign objects from airfield surfaces increased by several orders of magnitude.

This large strategic formation's rear services specialist personnel were subsequently forced to revise and restructure their approach to organization of flight operations airfield technical support and to increase the responsibility and answerability of persons in authority at all echelons for reducing the number of aircraft engines removed from service. Here is an example of another kind. In a large Air Force unit, over an extended period of time the number of aircraft engines taken down prematurely due to ingestion of foreign objects from airfield surfaces was running several dozen annually. When officer M. Tagintsev was placed in charge of the rear services of this large strategic formation, special attention on the part of the large strategic formation command element, subunit and unit commanders was drawn to this problem. It was necessary to put an end to a harmful practice which had taken firm root over the years, the practice of letting airfield surfaces remain neglected under heavy wear and deterioration, when main emphasis was placed on logging the targeted number of flight hours, even to the detriment of flight safety.

Today every Air Force unit commander must follow the proper procedure of scheduling flight operations taking into account time required for airfield minor repair and operational maintenance, as well as time for preliminary preparation on flight operations days.

Proper maintenance scheduling also includes at least three days continuously free of flight operations scheduling, for replacement of damaged slabs, for repairing sites where chipping and shearing/spalling has occurred,

for repairing concrete surface pealing, and for filling and patching runway slab joints. The situation has now been radically changed.

Personnel led by officers Yu. Safonov, N. Goncharenko, V. Prokofyev, and Ye. Ungarov have achieved considerable success in efforts to prevent premature removal of aircraft engines through the fault of rear services personnel.

Analysis and synthesis of the experience and know-how of vanguard workers is a guarantee of a high degree of operational reliability of military airfields, effective, efficient coordination between flight, engineer-technician and rear services personnel, and a guarantee of failure-free engine operation.

Developing Pilot Combat Aggressiveness and Initiative

91441413k Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 22-23

[Article, published under the heading "Flying—School of Combat Proficiency," by Maj A. Nadezhdin: "Initiative Assures Victory"]

[Text] The squadron commander thought over again and again the details of his subunit's forthcoming tactical air exercise. Bent over his desk, he carefully studied the draft version of the operational timetable. It is not difficult to figure what thoughts were going through Maj N. Vladimirov's head. Today the main emphasis is being placed on qualitative aspects of combat training. The number of tactical air exercises has been significantly reduced and, if the squadron commander makes a mistake in his calculations, the efforts of the entire squadron could go sour. They would have to wait for quite a long time for the next test of the achieved level of combat proficiency. It was for this reason that Vladimirov was mentally picturing the development of events for the umpteenth time, endeavoring to take all possible complications into account.

It is no secret that the actions of each pilot in a squadron tactical air exercise are determined by the concept and tactical intentions of the commander, who manages the battle both from the ground and in the air. This is entirely logical, since if the commander directs things from his command post, utilizing information provided by ground-based radars, he obtains an integral picture of the development of events. Therefore he is able more fully to assess the situation, to make a well-substantiated decision, and to concentrate the efforts of his aircrews on executing that decision. The commander in the air, placed in the same conditions pertaining to target detection as his other pilots, leads his force into the attack. He proceeds thereby from the position that the wingmen will once again act following his commands. Such is theory, as they say. But how do things stand in practice?

"No matter how smart a commander is, when he plans the mission he cannot foresee in advance with 100-percent assurance all details covering what will occur during the mission," says Major Vladimirov. "The road from plan to execution is rather thorny. The aircrews can expect various scenario instructions presenting tactical problems. Therefore, in order not to make a mistake in combat, every pilot must be prepared to make independent decisions. In other words, combat requires initiative, not blind execution."

Wherein lie the sources of initiative in fast-moving combat? Experience indicates that an important role here is played by advance elaboration of different tactical variations of combat actions and air-to-air combat plans, which as an aggregate constitute that foundation on which the pilot's personal initiative is grounded.

...The element led by Major Vladimirov had the mission of destroying an "enemy" tank column. When the aircraft reached the designated area, they found no tanks. How should they proceed? The easiest thing would have been to write it off to poor intelligence and return to base. But Vladimirov proceeded differently. Evaluating the situation and estimating fuel remaining, he decided to conduct follow-up reconnaissance. This initiative proved correct. The tank column was soon spotted by the edge of a forest, and the pilots, without pausing to form up, swept in and hit the target with aimed weapons delivery. This greatly eased the situation of the defending motorized rifle troops.

In general terms I do not believe there is any particular need to argue the importance of initiative in battle, for this is an axiomatic truth. The problem lies elsewhere. What is the framework of manifestation of initiative in conditions of modern-day air combat, when pilots are frequently obliged to act in strict conformity with instructions from a command post or commander? This is not an idle question. Unfortunately, when one is in the air it is difficult to discern the boundaries of initiative against the thicket of all manner of unnecessary situation simplifications, restrictions, and excessive caution. In order to answer this question more or less completely, we shall turn to an example from air combat training.

During a certain subunit tactical air exercise, I once happened to witness the following. On the remote terminal it was apparent that the target was proceeding at medium altitude and was not maneuvering. I remember thinking at the time: "These guys are obviously setting themselves up for the interceptors. They probably agreed in advance to set themselves up as an easy target." But my suspicions proved groundless. It appeared that the leader of the four-fighter element had failed to spot the easy prey. He and his wingmen continued their sweep and, several minutes later, spotted six "enemy" bombers at about 10 o'clock low. The interceptors attacked the bombers, not the decoy element.

It was later ascertained that the fighter element leader, Military Pilot 1st Class Maj A. Artyukh, had displayed

enviable sagacity, as he had figured out the adversary's ploy. And, what is very important, the flight commander, in making his decision, had not been simply guessing, which is just one step from defeat. Back on the ground he and his men had considered such a turn of events, had made the necessary calculations, and had rehearsed their actions using aircraft models. This is why they had failed to "take the bait." This is the reason for their confidence in the air, grounded not on reckless risk-taking, but on common sense. I believe that it does not make sense to limit or restrict such initiative.

Thus one can conclude that aggressiveness and initiative in combat constitute innovative development of the commander's plan and its implementation, as well as search for new tactical devices in conformity with the developing situation. And the framework and boundaries of the manifestation of initiative depend primarily on the degree of preparedness of the pilots.

Experience As An Ally

One at times ponders the question of why it is that two equally proficient units, operating in approximately the same conditions, guided by the same documents which prescribe instilling excellent moral-political and professional qualities in pilots, produce different results in combat training. And in that unit where results are worse, there always arises as well the problem of developing combat initiative in flight personnel.

In my opinion this happens because different subunits are guided differently by the documents which govern and regulate the training process. As practical experience shows, some commanders follow instructions from the central echelon blindfolded, so to speak, perceiving the paragraphs and sections of orders only as a shield in "confrontation" with inspection teams; others, while adhering to these documents, nevertheless perceive formal instructions not as dogma but as a foundation for innovation and are not afraid to assume responsibility.

Indeed, as modern aircraft enter operational service with the units, as the conditions of air combat operations become increasingly more complex, and as the boundaries of combat aggressiveness change, method and methodology are advancing in all areas of combat training. Failure to consider this fact means deliberately dooming oneself to fallbehind status in combat flying, tactical, and weapons delivery proficiency.

Maj N. Vladimirov shares his thoughts: "It has long since been proven that prompt and timely maneuver, buildup of efforts and mutual fire coordination in combat, as well as organization of multiple passes on the target are inconceivable without active innovativeness on the part of all pilots involved in combat, particularly the two-ship element and flight leaders. Even if the flight commander, for example, possesses a consummate mastery of his aircraft, weapons, and tactics, this is not enough to ensure victory. The leader should never forget his principal function: his job is quickly to assess the developing situation, figure out the 'adversary's' plan, find his weak points, distribute his men's efforts in the areas and directions selected for attack, etc. Also very important is an endeavor by his subordinates to develop initiative and combat aggressiveness, as well as critical analysis of their actions."

I should like to address the problem of dissemination of the advanced experience and know-how of experts in air-to-air combat and weapons delivery. In some subunits this matter has been formalized to such a degree that it produces nothing other than an empty wasting of time. The most disturbing and incomprehensible thing is the fact that even the experience of combat operations in Afghanistan, paid for with the blood of our fellow countrymen, is being ignored. Can it be that it has no applicability? Of course not! Everything depends on how one approaches it.

The most important thing in this regard is inquiry in the field of tactics—the pilot's second weapon. Closing on the target undetected, taking an advantageous position in respect to the adversary, and then delivering a sudden, unexpected, devastating attack—this is a scheme, simplified for easier comprehension, which offers extensive room for innovative search and inquiry. But a scheme which one can interpret as one likes is one thing, while combat is another thing altogether.

What maneuver is preferable in a given, specifically developing situation? In order to make a determination it is necessary, in addition to all else, to take into consideration the combat capabilities of the adversary's aircraft, the adversary's strong and weak points. Let us be frank: frequently this is not done in the course of preparing for exercises.

"Major Vladimirov relates: "Once we had an argument in our squadron about whether it makes sense to study the experience of the combat aviators in the Great Patriotic War. And, you know, most of the pilots, particularly the young ones, maintained that this experience is obsolete. I was quite honestly amazed at such a conclusion. Major Zagorelskiy, our deputy commander for political affairs, and I spent a long time thinking about how we could demonstrate the opposing point with greater convincingness. And we came up with a way. Two weeks prior to an exercise we invited in two combat veterans who had served with our outfit, briefing them in advance on the tactical problems which would be presented at the tactical air exercise. These combat veterans, basing their thinking on their own experience, suggested to us some action variations which it is unlikely we would have come up with on our own. We then unanimously agreed that such get-togethers should be held more frequently. Unfortunately this is not always possible due to our busy daily schedule. And yet it is a pity that we are unable to profit from this invaluable experience."

Discipline Is The Key

In conversations with airmen one frequently hears the question: how does one combine initiative and combat

aggressiveness in the course of daily flight operations with strict adherence to the regulations which govern flight activities? Yes, flight rules and regulations are stringent. That is the way things must be. Any unwarranted departure from established procedures can lead to serious, sometimes irreparable consequences. Reducing the incidence of air mishaps is a priority task. We do not have the right to lose lives in peacetime. This is why one cannot equate such concepts as combat aggressiveness and reckless derring-do.

Practical experience indicates that one of the reasons for violation of safety procedures by some pilots lies in unskillful utilization of the excellent flying and fighting qualities of one's aircraft, and exceeding operating limits. In other words, violating established flight rules and procedures does not constitute combat aggressiveness but rather the opposite. Only highly-disciplined and well-trained pilots can fully carry out a mission in the most difficult combat environment. Victory requires a synthesis of discipline and professional competence. In addition, rigorously orderly procedure and a high degree of flight discipline are simply essential in order successfully to master the entire arsenal of combat tactics.

"All this is true," agreed Maj N. Vladimirov. "But at the same time one cannot ignore all the excessive situation simplifications and compromises with realism in combat training. But unfortunately there is a fairly persistent trend in this direction. And some officers conceal their elementary overcautiousness, their fear of jeopardizing their career advance, and their endeavor to hold on to their commander slot at all costs or to exchange it for a higher position behind claims of 'campaign' for flight safety. Such subunit commanders fail to think about the fact that in a situation which excludes the possibility of bold, resolute actions, pilots cannot learn that which is essential in actual combat. It is criminal to put one's own career considerations ahead of the nation's defense capability. Perhaps I have put it a bit too strongly, but I believe that this is the case."

One is hard put not to agree with Nikolay Andreyevich. Obviously a high level of tactical proficiency and readiness to respond to the adversary's most unexpected moves, with the adversary in turn seeking to gain the element of surprise and to seize the initiative, can be developed in combat pilots only with an innovative approach to organization of mock combat. In connection with this it is very important that intelligent, initiative-displaying actions by flight personnel, directed toward better accomplishing the assigned mission, be correctly understood and viewed not one-sidedly, not as a manifestation of indiscipline, but be thoroughly analyzed, objectively evaluated, and that the most expedient of these actions become available to all.

...The tactical air exercise ended late in the evening. Major Vladimirov entered the squadron office, headed over to the window and opened it wide. The invigorating aroma of summer grasses invaded the room. Following his customary habit, Nikolay Andreyevich proceeded to pace back and forth. Without turning on the light, he sat at his desk, on which he had left the draft operational timetable for the tactical air exercise. The marks and symbols on the paper were barely discernible. Events had shown that they had been placed correctly. The subunit had received a solid mark of 4 on the exercise. The squadron commander had not labored over the complicated tactical problems in vain....

Dangerous Situations During Air-to-Ground Attack

91441413X

[Editorial report] Moscow AVIATSIYA I KOSMONAVTIKA in Russian Number 7 of July 1989 publishes on pages 24-25 a two-page graphic diagram showing the approach to and departure from ground targets by a fighter or ground attack aircraft in the process of delivering ordnance on target. The accompanying text describes the situations in which the aircraft is at risk. The text reads as follows:

"Dangerous Situations During Weapons Delivery at Air-to-Ground Ranges

Key: 1. Potential collision situation between aircraft (individually and in a multiaircraft element) on a target run and heading back from target, arriving at and leaving the range

2. Stall during turn to final target heading

3. Stall during weapons aiming

4. Descent below designated altitude

5. Being hit by munitions fragments

6. Stall during breakaway following weapons delivery."

U.S. Launch Vehicles Claimed Harmful to Ozone Layer

91441413l Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 28-29

[Article, published under the heading "Problems of Astronautics," by Candidate of Technical Sciences V. Filin, deputy chief designer of the Energiya space shuttle launch vehicle system; Doctor of Technical Sciences Professor V. Burdakov: "Global Ecological Threat"]

[Text] **Implementation of the SDI program could lead to the destruction of atmospheric ozone and the demise of mankind.**

Continued testing of solid-propellant rockets is leading to a sharp increase in incidence of skin cancer.

* * *

World science and the world community have sounded the alarm: we are on the brink of an ecological crisis. This subject is being discussed in international organizations, at symposia and conferences. A campaign has been launched: for clean air and clean water, for intelligent use of natural resources, and a for preservationist attitude toward those areas of the world which are still pristine.

Our vanguard fields of endeavor, such as aviation and the space program, are also faced with ecological problem issues. In aviation there has begun a search for new, economical engines as well as efforts to develop environmentally clean fuels. Confirmation of this is the first successful hydrogen-fueled flight of a Tu-155 in the fall of 1988.

But what effect do rockets and space vehicles have on the environment? At first glance it would seem to be insignificant, for the flight of a rocket lasts only a few minutes, while a space vehicle "lives" in airless space. Analysis indicates, however, that there are problems here as well—both terrestrial and atmospheric.

We shall not go into the ecology of downrange areas, be it ocean, desert, or grassland steppe, where spent booster stages carrying fuel remnants impact and where, depending on the components in question, damage can exceed all expectations; nor will we be considering ground launch facilities and aborted launches which end with impact "over the hill." We shall examine only one of the problems of rocket flight—its effect on the atmospheric ozone layer, which plays an exceptionally important role in the heat budget of the earth's atmosphere and in protecting terrestrial life from solar ultraviolet radiation.

Today the term "ozone layer" applies to a spherical layer of atmosphere with a maximum relative concentration of ozone typical for altitudes from 20 to 50 kilometers. Absolute ozone concentration, which is highest at the earth's surface, practically disappears at an altitude of 70 km. If the entirety of atmospheric ozone were reduced to standard conditions (pressure 10^5Pa, temperature 273 degrees Kelvin, density 1.92 kg/m^3), the equivalent ozone layer thickness would not exceed 3-4 mm.

We should note that in the United States regular observations of the ozone layer have been conducted for many years. Since 1945 these activities have been conducted by an Air Force research center and the Naval Research Laboratory—initially in New Mexico and subsequently in other parts of the world.

At the present time the United States possess the most reliable information on the distribution of ozone in the atmosphere and its dynamics.

Ozone is distributed nonuniformly in the atmosphere. In addition to "clouds" (up to 25 mm layer equivalent thickness), "holes in the ozone layer" (less than 2 mm) are observed, the honor of discovery of which, strange as it may seem, goes to the British, who apparently did not coordinate their publications with their U.S. colleagues.

Journalists in all countries began writing about a "hole" in the ozone layer in 1985, and the mass production of UV hazard level warning counter devices was undertaken in Japan. The global decrease in ozone concentration had become fact.

As research shows, concentration of this gas varies by time of day. Breakdown occurs during daylight hours, while at night it is restored by the collision of oxygen atoms and molecules as well as other particles possessing high kinetic energy. At the poles, where the polar night is of long duration, atmospheric components become cool, that is, lose their energy. As a result a spring concentration minimum occurs over Antarctica. But this is apparently a natural process, just as is the breakdown of ozone as a result of volcanic activity, which is characterized by ejection into the atmosphere of nitrogen compounds and chlorine, which are harmful to ozone.

The most potent enemy of ozone is chlorine, a single molecule of which can destroy up to 100,000 ozone molecules. Oxides of nitrogen are capable of breaking down a quantity of ozone which exceeds their mass by a full order of magnitude.

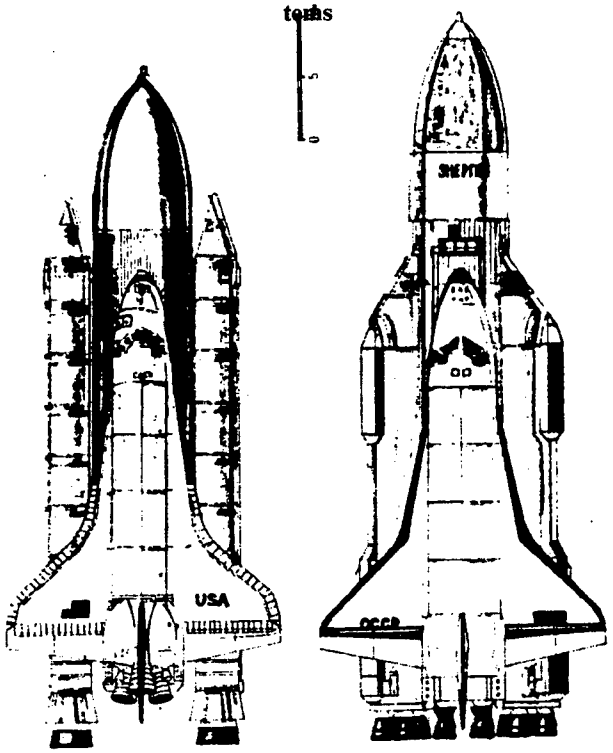
Man-caused injection of substances into the atmosphere has increased considerably with the growth of industry. In the 1980's, for example, the release of chlorine has been exceeding by more than double the amount of chlorine formed as a result of volcanic activity. This is running about 1 million tons a year. The release of compounds of nitrogen is due to the operation of internal-combustion engines, power generating and industrial plants. Each year as much as 100,000 tons of nitrogen compounds is released into the atmosphere solely as a result of fertilizer manufacture. These enormous quantities of chlorine and oxides of nitrogen, however, are for the most part returned to the earth's surface together with precipitation. Only a very small part reaches the ozone layer.

What effect do rockets have on the atmosphere? We shall examine this question with the examples of the Energiya booster and the Space Shuttle. It is primarily rocket engine fuel combustion products which affect the environment. The following table lists constituents released at altitudes of 0-50 km by the operation of rocket engines (amounts in tons).

Table

	Chlorine, Hydrogen Chloride	Oxides of Nitrogen	Oxides of Carbon	Water, Hydrogen	Oxides of Aluminum
Energiya	0	0	740	750	0
Space Shuttle	188	7	380	500	177

Energiya-Buran and U.S. Space Shuttle Launch Systems

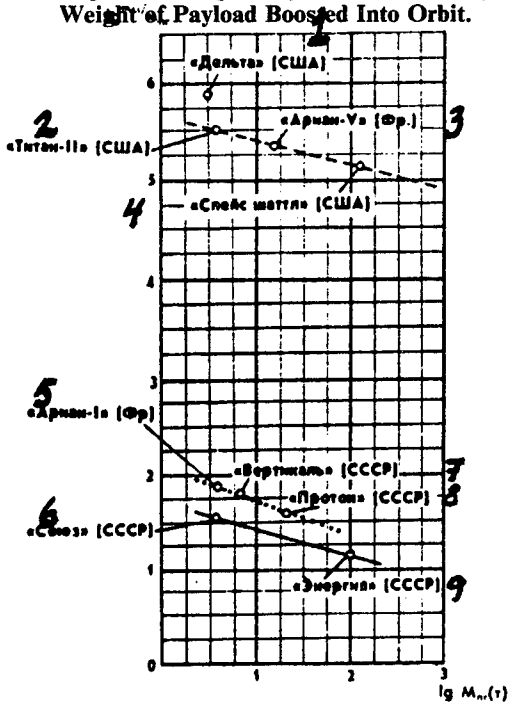


These figures do not favor the U.S. system. If we assume that all exhaust gases will react with ozone, ozone loss could total 1,500 tons with an Energiya launch, while the loss will amount to 10 million tons in the case of a U.S. shuttle launch. Thus the American system causes 7,000 times as much harm as the Soviet system. We should note that the total mass of ozone in the atmosphere is only 3 billion tons.

Let us now compare the Energiya with other launch vehicles. Analysis of the graph also indicates that, burning identical fuels, use of medium launch vehicles to launch satellites causes more harm per ton of payload than when using the heaviest-category launch vehicles. It follows from this that as launch vehicles become more powerful (greater payload), their specific ecological cleanness increases. In other words, in order to preserve the ozone layer it would be advisable to use a superheavy-lift launch vehicle to boost several payloads into orbit.

It was noted in a report published in the press that as of 5 September 1987 the ozone concentration had decreased by 10 percent over an area of 3 million square kilometers. Since the total area of the atmospheric ozone layer is 500 million square kilometers, it is not difficult to determine the absolute loss of ozone, which amounted to 2×10^6 tons. One could draw the assumption (taking into account natural restoration of ozone) that, alongside other sources of pollution, an important role in the process of such a massive global depletion of ozone has been played by the 25 Space Shuttle launches and launches of other solid-fuel boosters.

Relationship Between Quantity of Ozone Destroyed and Weight of Payload Boosted Into Orbit.



Зависимость уничтожаемого озона от массы выводимого полезного груза.
a. — — — — — ракеты-носители с твердотопливными ускорителями;
b. ..... ракеты-носители на высококипящих компонентах;
c. ——— ракеты-носители на экологически чистых компонентах.

Key:
a. launch vehicles with solid-fuel booster stages;
b. launch vehicles using high-boiling-point fuel constituents;
c. launch vehicles using ecologically clean fuel constituents.
1. Delta (U.S.)
2. Titan II (U.S.)
3. Ariane V (France)
4. Space Shuttle (U.S.)
5. Ariane I (France)
6. Soyuz (USSR)
7. Vertikal (USSR)
8. Proton (USSR)
9. Energiya (USSR)

A number of Western scientists, for the most part American, are of the opinion that Space Shuttle launches are virtually harmless to the ozone layer, since its concentration decreases by "only" 0.25 percent immediately after each launch, based on measurements taken in the launch vehicle passage zone of disturbance. But nothing is reported about the size of the disturbed zone, the duration of its existence, or the dynamics involved. At the same time it is known that in the Northern Hemisphere intensive jet streams (winds) are predominant at the altitude at which the ozone layer exists; at an altitude of 50 kilometers the velocity of these jet streams can reach extreme hurricane force—up to 100 meters per

second. Under these conditions rocket exhaust gases will be carried fairly rapidly throughout the earth's entire ozone layer.

At the present time it is difficult to make accurate quantitative calculations on the effect of missile and space launches on the ozone layer, as well as other forms of man-caused effect. Some experts are even utilizing this to conceal the true state of affairs, for solid-fuel rocket engines are widely used by U.S. missiles and space program launch vehicles. This apparently also explains the fact that no serious scientific studies on the effect of missiles and space program launch vehicles on the ozone layer have been published in the United States. Instead many articles have been published containing appeals not to use chlorofluorocarbons, including as aerosol propellants, since fluorinated hydrocarbons do not readily break down in the atmosphere: F-11 persists for 75 years, and F-12 persists for 100 years. In addition, industrial plants which release nitrates, water vapor and oxides of carbon into the atmosphere are the targets of justified but far from objective attacks.

The entire world community has joined the campaign against CFCs. Pursuant to the Montreal Convention, signed by 24 countries, including the USSR, and which went into effect in 1989 upon being ratified by 11 states, by the mid-1990's use of chlorofluorocarbons is to be frozen at the 1986 level, while production is to be cut in half by 1999.

Calculations indicate that if effective measures are not taken in a prompt and timely manner, within 25 years ozone content in the ozone layer could decrease by 16 percent.

A question arises: what should be done about booster rockets? If no action is taken, the contribution of booster rockets toward destroying the ozone layer will amount to at least 10 percent of the total projected man-caused effect on the stratosphere by the year 2005.

We cannot allow the luxury of permitting even a 10 percent ozone loss. Scientists believe that just a 1 percent ozone loss leads to a 6 percent increase in cases of skin cancer.

What can be done to reduce the effect of launch vehicles on the ozone layer?

First of all, launches should be fairly infrequent, in order for restoration of the ozone layer to proceed in a natural fashion. It would be advisable to use a single superheavy-lift launch vehicle to boost a number of payloads into orbit at the same time. Secondly, launch vehicles should use ecologically clean fuel constituents, which have minimal effect on the ozone layer. The Energiya launch vehicle fully meets these requirements. Third, all warhead delivery systems powered by solid-propellant engines should be totally eliminated, and their development and testing should be terminated. Finally, future launch vehicles for boosting shuttle-type vehicles into orbit, such as the British (Khotol) and the West German Senger, as well as choice of trajectory of boost into orbit, should be reexamined and revised from an ecological standpoint. Their presence in the ozone layer should be as brief as possible.

Here is another idea prompted by the Montreal Convention. Is it not high time to adopt in the area of space exploration strict procedures to monitor the use of hardware, to establish an international system for approving and certifying launch vehicles, and to establish parity between countries pertaining to number of launches, and not only from the standpoint of preserving the ozone layer but also in order to reduce other harmful effects on the environment?

In this period of international detente, resolution of these problems is becoming not only a good idea but also a real possibility.

Projects to Study Magnetosphere, Ionosphere

91441413m Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 38-39

[Article, published under the heading "Future of the Space Program," by Yu. Zaytsev, department head, USSR Academy of Sciences Institute for Space Research: "In an Ocean of Plasma"; conclusion, second part of two-part article (Part 1, see AVIATSIYA I KOSMONAVTIKA, No 6, 1989)]

[Text] Very low-frequency RF-band electromagnetic energy emitted by a satellite-borne transmitter will act upon the surrounding medium in Project Aktivnyy, which is scheduled for 1989. This project was organized by the joint efforts of specialists from the People's Republic of Bulgaria, the Hungarian People's Republic, the GDR, the Polish People's Republic, the USSR, and the Czechoslovak Socialist Republic.

The project calls for launching two satellites—a primary vehicle, developed in the Soviet Union, and a subsatellite, designed and built in Czechoslovakia.

The lead organization engaged in preparation and execution of Project Aktivnyy is the USSR Academy of Sciences Institute for Space Research. The purpose of the project is combined research on propagation of extremely low-frequency (ELF) electromagnetic waves in the earth's magnetosphere and their interaction with energetic charged particles in the radiation belts.

According to preliminary estimates, the amplitude of bunches of ELF electromagnetic energy emitted by the satellite-born transmitter in a waveguide channel should be not less than during operation of the most powerful ground radio transmitters, while a so-called close-in zone is created in the vicinity of the satellite, with typical dimensions in the order of several kilometers. It will

function as a unique plasma laboratory, in which the interaction of electromagnetic oscillations with plasma is to be investigated.

Aktivnyy is the first experiment in space where a controllable subsatellite will be used to investigate the spatial structure of physical phenomena associated with injection of high-power ELF emissions into the magnetosphere. The subsatellite will function as a unique probe, slowly separating from the primary vehicle. Subsequently the distance between primary satellite and subsatellite will vary in a controlled manner, ranging from 100 meters to 100 kilometers, using a vernier or course correction propulsion unit. Thus not only the close-in emission zone but also phenomena in an intermediate and far-out zone can be investigated with the subsatellite.

Conversion of the power of the onboard ELF oscillator into electromagnetic emission will be accomplished with a circular antenna 20 meters in diameter. A small tube of soft, pliable aluminum alloy with wall thickness of 1 millimeter will be used as antenna winding form. It is formed into a special sectional shape and carried into orbit undeployed.

Both the primary satellite and the subsatellite carry identical instrumentation for investigating ELF fields, plasma, and energetic particles. Simultaneously with the satellite measurements, observations will be conducted from the ground using an extensive network of stations located in Cuba, the USSR, Czechoslovakia, as well as in a number of other countries.

The APEKS project is also scheduled for 1989, which will involve satellite plasma experiments with injection of electron beams and plasma clusters into the magnetosphere. The lead organization for this project is the USSR Academy of Sciences Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation. Work on this project is being done on an international cooperative basis with scientists in the Hungarian People's Republic, GDR, People's Republic of Bulgaria, Polish People's Republic, Socialist Republic of Romania, and the Czechoslovak Socialist Republic.

APEKS will be a logical continuation of the ARAKS (USSR-France) and PORKUPAYN/PORCUPINE (USSR-Sweden) active rocket experiments. We should recall that two French rockets launched from Kerguelen Island in the Indian Ocean were used in the ARAKS project. Each rocket carried a Soviet 15-kilowatt plasma gun, which injected beams of electrons with an energy of 27,000 and 15,000 electron-volts into the ionosphere and magnetosphere. Optical and radar stations were located in a magnetically coupled area (Arkhangelsk Oblast) and to the south of it, which made it possible to detect and record arrival of an electron beam into the Northern Hemisphere. In the course of the experiment they also succeeded in identifying and monitoring excitation of waves caused by the beam of electrons during movement in the ionosphere and earth's magnetosphere and in studying the conditions of their propagation.

The PORCUPINE experiments were performed using meteorological rockets.

The principal scientific tasks of the APEKS project include simulation and injection of polar auroras and radio-frequency emissions in the auroral region and investigation of the dynamics of processes and phenomena produced by beam injection, its interaction with and propagation in the background medium. The experiment will also make it possible to trace magnetic field force lines (injection and subsequent ground recording of glow) which, in particular, will make it possible to determine their length. In addition to accomplishing the project's main goals, this will significantly increase the accuracy of current geomagnetic field models. At the present time the location of magnetically-coupled areas is known with an accuracy of not better than 70 kilometers.

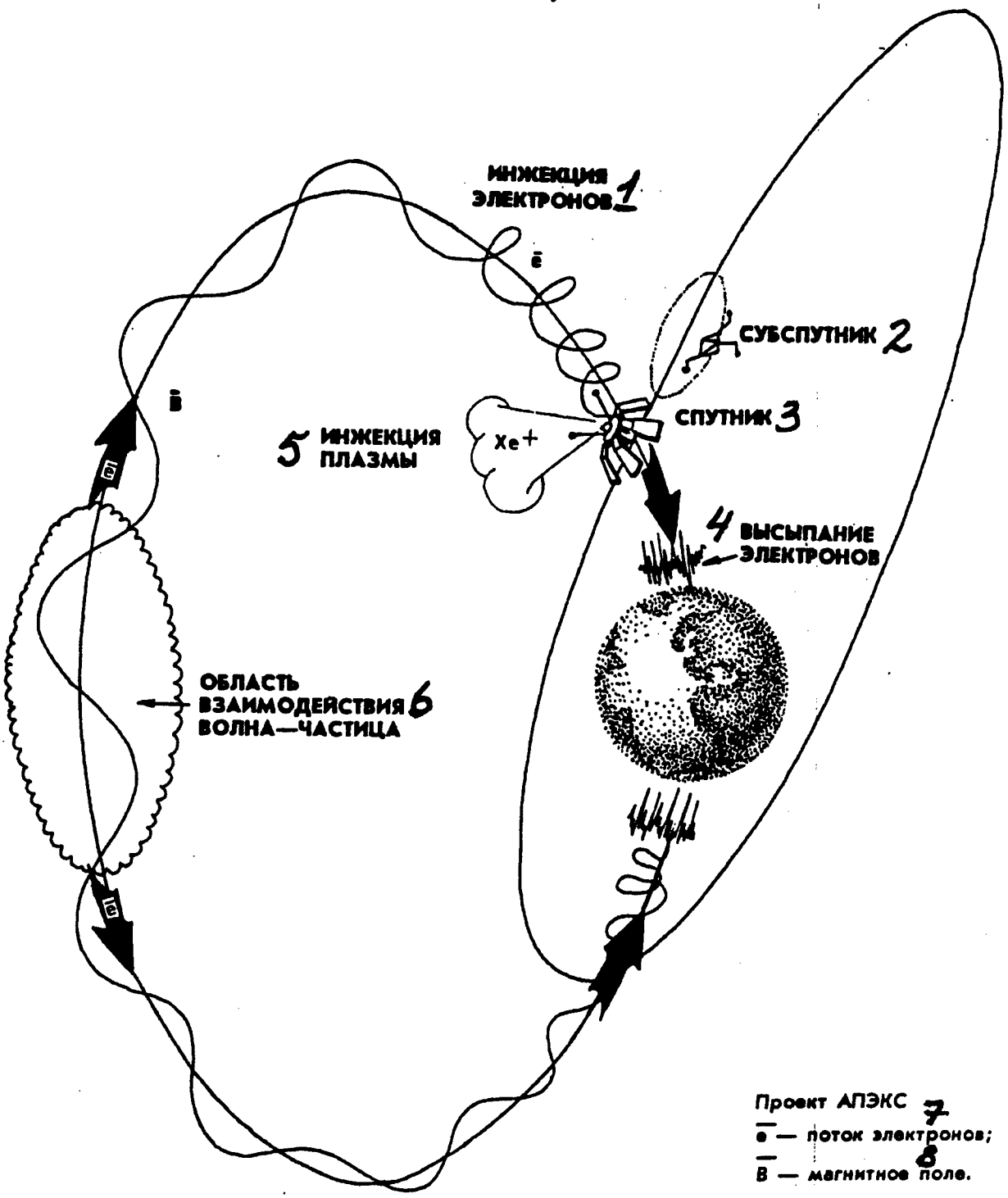
In addition to satellite-borne plasma investigations, the project also includes ground, balloon and rocket observations (correlated measurements through all altitudes are taken at various times) from the satellite's position to the earth's surface. Although the main purpose of the APEKS project is the conduct of active experiments, it also includes observations of geophysical phenomena in passive mode, that is, when injection of beams of electrons and plasma is not being conducted.

Just as the Aktivnyy project, APEKS involves synchronous measurement of the principal physical parameters of the medium, the beam and generated field by instruments carried aboard two vehicles separated in space—the primary satellite and the subsatellite. Simultaneous measurements will be taken both at various distances between vehicles (from 10 meters to 1,000-2,000 kilometers) and in different (in respect to regions of disturbance of the medium and beam propagation) zones of the magnetosphere and ionosphere.

In the future it is planned to extend the conduct of similar active experiments with injection of electron beams and plasma clusters to distances extending up to several earth radii. This will make it possible directly to model and diagnose magnetospheric processes which determine the course of various auroral phenomena.

The Aktivnyy 2 project, the task of which is to study effects caused by excitation in the earth's ionosphere and magnetosphere simultaneously of ELF emissions and by injection of plasma and electron beams and neutral gas, scheduled for the first half of the 1990's, will be a continuation of the Aktivnyy and APEKS projects. The possibility of increasing applied power over previous experiments as well as utilization of plasma and beam antennas is being considered. Subsatellites are to be used, just as in the preceding experiments, to obtain data on physical processes at various distances from the primary satellite.

APEKS Project



Key:
1. Injection of electrons
2. Subsatellite
3. Satellite
4. Pouring out of electrons
5. Injection of plasma
6. Wave-particle interaction region
7. flux of electrons
8. magnetic field

Active experiments will help not only understand the fundamental processes taking place in space and their cause-and-effect linkages, but will also help address the question of controlled influence on these processes. The fact is that the aggregate of energetic particles contained in the radiation belt and confined by the earth's magnetic field can be viewed as a kind of giant maser. If it is brought out of a state of equilibrium (to the excitation threshold), it should intensively emit electromagnetic oscillations and splash a substantial portion of the energy of the radiation belts into the atmosphere in the form of energetic particles. Reproduction of such phenomena, a kind of "trigger," and study of their subsequent practical application is a very tempting prospect.

The first results of plasma investigations conducted by the Fobos project are now available. Measurements of the components of the plasma surrounding Mars, conducted by Fobos 2 as it orbited that planet, definitely constitute an achievement. In particular, the planetary origin of oxygen ions proceeding from Mars out into space was established. In addition, indirect evidence was obtained for the presence of radiation belts in the weak Martian magnetosphere. Plasma waves were measured for the first time at an electron-ion frequency in Mars-adjacent space. This made it possible to determine plasma density, which was another object of investigation.

The Mars-94 project opens up exceptional opportunities to study the unique Martian magnetosphere and its interaction with the solar wind. One of the features of the plasma component of this project is the mutually complementary nature of measurements. This will make it possible to conduct fairly complete plasma-physics investigations in the vicinity of our planet. They will include measurements of magnetic field, hot and cold plasma, plasma waves and energetic particles. Investigations of the Martian plasma and outer Martian mantles will help gain a better understanding of the nature of that planet and its evolution.

New Soviet "Defensive" Military Doctrine Praised

91441413n Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 89 (signed to press 5 Jun 89) pp 42-43

[Article, published under the heading "Today's World and the New Thinking," by Col Yu. Silchenko, candidate of historical sciences: "The Innovative Nature of Soviet Military Doctrine"]

[Text] Profound changes are taking place in all domains of Soviet societal affairs at the present stage of perestroyka. Dynamic processes are also observed in military affairs, under their influence and in an organic unity with them. The importance of a scientific approach to issues of national defense and further strengthening of our country's Armed Forces is increasing immeasurably in these conditions, which is reflected in a most concentrated form in the innovative development of Soviet military doctrine.

As a general statement about military doctrine, one should note that its principal elements and main points should proceed from actually-existing realities. They are determined by the state's domestic and foreign policy, by its sociopolitical, economic and geographic features, and by the level of development of production. In the final analysis the content of military doctrine is determined by the character of the state's societal system and its policies.

Our military doctrine was created precisely on this platform. V. I. Lenin laid down its foundations. To him goes the credit for elaboration of the political aspects of the character and type of wars of the contemporary era, the fundamental goal of Soviet foreign policy, and the influence of the level of this country's defense capability on securing a firm peace, the conduct of modern wars by peoples and the importance of a thorough understanding of the political content of war by the worker masses, as well as the role of proletarian internationalism in preventing war.

As we know, V. I. Lenin developed a number of tenets of Marxism on the nature of the military organization of the victorious proletariat, elaborated the principles of organizational development of the Red Army, and formulated the foundations of Soviet military art. All this created the necessary foundation for profound elaboration of the military-technical content of doctrine.

Research on this problem was conducted by gifted representatives of the Soviet school of military theory M. Frunze, S. Gusev, M. Tukhachevskiy, B. Shaposhnikov, A. Yegorov, V. Triandafillov, and others. A particularly important role was played by M. Frunze who, on the basis of the writings and instructions of V. I. Lenin on defense issues and on party program documents, advanced a thesis on two aspects of doctrine—political and military-technical, and laid forth a number of fundamental aspects of the nature of a future war and defense of the socialist state. He pointed out that defense of a socialist nation should be grounded "first of all, on a clear and precise understanding of the nature of a future war; second, on a correct and accurate consideration of the manpower, resources, and assets which our potential adversaries will possess; third, on a like consideration of our own resources." Many of the theoretical writings of M. Frunze have retained their relevance up to the present day.

Thus was formed the military doctrine of the world's first socialist state. Its character in the interwar years was determined by the peace-seeking policy of the party and Soviet State. For this reason efforts to prevent war and establish good relations with other countries were a most important, integral element of the political aspect of Soviet military doctrine. Various treaties and agreements were entered into with more than 40 countries on this basis just between 1921 and 1925. This improved the international situation, reduced the level of military confrontation, particularly in Europe, and fostered a reduction in the numerical size of our military, which did not exceed 600,000 men up to the mid-1930's. In the 1920's, thanks to a flexible policy and exceptional tenacity on the part of our government, the Soviet Union

succeeded in thwarting a number of attempts to draw us into war and armed conflicts.

In conformity with our military doctrine, war was unequivocally viewed as a forced form of actions, which can be employed only to defend the achievements of socialism against possible aggression. On the whole it met the requirements of the times during that period.

At the same time we must note the somewhat limited nature of points of doctrine, especially in the latter half of the 1930's, as well as certain deficiencies in points of doctrine as regards practical implementation. To a large degree this was a consequence of the J. Stalin cult of personality. I believe that they were manifested in the fact that the diplomatic efforts of our state to prevent fascist aggression were conducted without adequate reinforcement by military measures. Confirmation of this is the statement released by the All-Union Communist Party (Bolshevik) Central Committee commission appointed in connection with the stepping down of K. Voroshilov from the position of people's commissar of defense. The document noted: "The people's commissariat is lagging behind in elaboration of matters pertaining to operational utilization of forces in a contemporary war. There are no firmly-established views on the employment of tanks, air forces, and airborne assault.... The percentage share of mechanized forces remains low."

The Air Force was also in a difficult state. Many gifted military commanders had been the victims of repression. The chief of the Main Directorate of the Air Force was replaced practically annually. The last of these, 30-year-old Gen P. Rychagov, was arrested on the eve of the war and subsequently executed. As of June 1941 only approximately 20 percent of our Air Force inventory consisted of new combat aircraft. The remainder were obsolete and of many different types and models, which made servicing and maintenance more difficult. The program of construction and renovation of airfields in the western frontier military districts had not been completed. This led to excessively concentrated deployment of aircraft and to unwarrantedly high losses of aircraft on the ground at the beginning of the war.

The overall planning concept of J. Stalin, who feared that bringing Soviet forces to a full state of combat readiness, declaring mobilization, and moving troops toward the border could do considerable damage to political actions aimed at averting or delaying war, was profoundly erroneous. Miscalculations by the country's leaders made effective preparations to repulse aggression essentially impossible, hamstrung the independence of command personnel, resulted in and brought the day of tragic events closer.

Nevertheless Soviet military doctrine, innovatively reassessed and enriched with new scientific and practical formulations, proved its superiority and in the final analysis led to the total defeat of Hitlerite Germany, its satellites, and militarist Japan.

Substantial changes in the military doctrine of the Soviet State also took place in the postwar period. Military doctrine took into account the fact that a qualitatively new correlation of forces had formed in the international arena after 1948. A world socialist system, which had become a powerful social, economic, and military factor of societal development, had formed and consolidated. More than 100 liberated states formed on the rubble of the colonial system. At the same time the aggressiveness of imperialism, of U.S. imperialism in particular, had grown more intense. Scientific and technological advances and qualitative changes in the material and technological foundation of modern armed forces and in the modes of conduct of armed combat were also taken into account.

On the whole the new realities required changing many points of military doctrine, both political and connected with means and modes of reliable defense of the Soviet Union and the socialist community against imperialist aggression. These were also taken into account.

The 27th CPSU Congress and the 19th All-Union Party Conference were landmark events in the development of Marxism-Leninism as a whole and its military views. The basic points of modern military doctrine of the Soviet State and the Warsaw Pact member nations were formulated in the congress and conference proceedings and in the document entitled "On the Military Doctrine of the Warsaw Pact Member States," adopted at a meeting of the Political Consultative Committee in Berlin in May 1987, on the basis of a thorough analysis of events in the world, trends in development of military affairs, and in a spirit of the new political thinking.

A fundamental distinctive feature of contemporary military doctrine—its purely defensive directional thrust, which encompasses both the political and the military-technical aspects—is primarily emphasized in these documents. We must note in this connection that the content of the defensive directional thrust of contemporary military doctrine differs substantially from content in the past. In the past it was manifested with a correlation of peace and war forces whereby war was inevitable and was considered an effective instrument of policy and means of achieving political goals. At that time the basic function of Soviet military doctrine consisted chiefly in ensuring adequate resistance to the aggressor in case of attack.

Now conditions have changed. Today the two leading nuclear powers—the USSR and the United States—have amassed enormous nuclear might. In addition, several other states have established and are constantly improving their own arsenals of mass destruction weapons. If the amassed weapons are put into play, mankind would be threatened with total annihilation. This has also been a factor in development in the socialist countries of contemporary views on the problems of war and peace. They are manifested in new political thinking, grounded on which, the defensive nature of present-day military doctrine signifies not only resolute repelling of aggression but also, and primarily, a

war of total annihilation. "The military doctrine of the Warsaw Pact, just as that of each of its members," reads the document of the meeting of the Political Consultative Committee, "is subordinated to the task of preventing war—both nuclear and conventional."

Present doctrine constitutes a system of fundamental views on preventing war, on military organizational development, on preparing the brother countries and their armed forces to repel aggression, and on modes of conduct of armed combat in defense of socialism.

Thus prevention of war is the supreme goal and a basic function of the Soviet State and its Armed Forces. The most important and newest element in the content of military doctrine is its subordination to the task of preventing war. One should note, it is true, that in the past as well, as stated above, efforts to prevent war constituted one of the principal elements of the foreign-policy activity of the Soviet Union. But nevertheless at no time in the past has there been such emphasis as is being placed today on preventing war and eliminating the component of force from relations between states. "The time and realities of today's world," stressed Comrade M. S. Gorbachev in his address before the United Nations last December, "demand that we place our stakes on internationalization of dialogue and the process of negotiation."

The defensive nature of today's military doctrine is also manifested in pledges announced by the Soviet Union to the entire world that it will never, under no circumstances whatsoever, initiate military actions against any other state, unless we ourselves are subjected to aggression, as well as a pledge never to be the first to use nuclear weapons, under any conditions whatsoever.

This policy orientation is being implemented via an entire system of Soviet proposals aimed at preventing the danger of war. Initial successes toward disarmament have been achieved precisely thanks to the constructive position taken by the Soviet leadership, the freshness of their approaches and solutions to a number of problems which are of vital importance to mankind.

The INF Treaty entered into by the USSR and the United States is a confirmation of this. Pursuant to this treaty, approximately 40 percent of Soviet and U.S. missiles have already been eliminated. There has been a reduction in situation unpredictability connected with the short flight time of the Pershing II and RSD-10 [SS-20] missiles. There have also been positive changes in other talks pertaining to disarmament. This suggests future progress in this area and an overall decrease in military tension.

The conclusion that military-strategic parity is a means of preventing war and a major factor in peace and the security of peoples is also a new point in our doctrine. The USSR proceeds from the position that in conditions of an arms race, in time military-strategic parity will be unable to perform a function of deterrence. A further increase in the level of such parity would not provide anybody with greater security. This is why the Soviet Union and the other countries of the socialist community advocate decreasing the existing level of military-strategic parity to limits of reasonable sufficiency for defense.

The defensive directional thrust of our doctrine is also expressed in military organizational development, in structural reorganization of the Armed Forces. Of exceptional importance in this is the point of doctrine expressed at the 19th All-Union Party Conference to the effect that our defense organizational development and its effectiveness should be secured primarily by qualitative parameters—both in respect to technology and military science and in the strength and composition of the Armed Forces. This point of doctrine lays forth the long-term tasks of party defense policy.

We should note that the Soviet Union, in agreement with its allies, has already unilaterally undertaken a number of major steps which give military doctrine specific, clearly-marked defensive traits.

As we know, in the period 1989-1990 the USSR Armed Forces will be reduced by 500,000 men or by 12 percent. As applied to Europe, reductions will involve Soviet forces stationed as components of the Group of Soviet Forces in Germany, Central Group of Forces, Southern Group of Forces, Northern Group of Forces, and in the European part of our country—a total of 240,000 men, 10,000 tanks, 8,500 artillery systems, and 820 combat aircraft. The military budget will be reduced by 14.2 percent, and production of arms and military hardware will be cut by 19.5 percent.

The structure of the Armed Forces is also changing. In particular, the total number of military districts, large strategic formations [obyedineniya], and combined units [soyedineniya] is being reduced. Ratios of offensive to defensive arms are being revised, as are dispositions of troops and naval forces.

These are some of the points which characterize the defensive thrust of Soviet military doctrine.

Standing up in high relief against the background of these points is, on the one hand, the falsity of claims by bourgeois ideologues and politicians about Soviet expansionism and aggressiveness of the Soviet Armed Forces and, on the other hand, the imperial, aggressive nature of the military doctrine of the NATO countries. Although bourgeois politicians attempt to conceal it, expatiating about the allegedly purely defensive, just aims of their military doctrine, the facts attest to something else altogether. As was emphasized by USSR Minister of Defense Army Gen D. T. Yazov, their doctrines of "flexible response" and "direct confrontation" are essentially aimed at achieving total and undisputed superiority.

Adhering to yesterday's political thinking, reactionary Western circles stubbornly oppose agreements on mutual repudiation of a nuclear first strike and of using force to settle political differences and adhere to the concept of "nuclear deterrence." The Soviet Union has not yet received support for its proposal to the United States and its NATO allies that consultations be held for the purpose of comparing military doctrines, ending existing

concern and suspicion, and achieving a better understanding of one another's intentions.

Soviet military doctrine, an example of the new political thinking, is of fundamental significance for the practical activities of Air Force personnel. It serves as a cementing force and gives purposefulness and direction to the efforts of Air Force personnel to maintain units and subunits at a high state of operational readiness and to ensure unity of views pertaining to the principal areas of restructuring of the Air Force.

U.S. Air-Launched Cruise Missile Developments

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[Article, published under the heading "The Pentagon's Strategic Arsenal," by Col V. Yefimov, candidate of technical sciences, and Lt Col G. Kosenyuk, candidate of technical sciences: "Wings of the Nuclear Triad"; based on materials published in the foreign press]

[Text] Attempting to circumvent the INF Treaty, the NATO bosses are attempting to shift military-strategic parity to their own advantage. In spite of the defensive thrust of USSR military doctrine, they are nurturing plans to "compensate" for the elimination-designated missiles on the European continent with additional deployment of such nuclear warhead delivery systems as cruise missiles. Toward this end work is in progress on upgrading existing and developing future missiles, both tactical missiles and ground-launched, sea-launched, and air-launched intercontinental-range missiles.

The Pentagon is placing particular hopes on AGM-86B or ALCM air-launched strategic cruise missiles, to be carried by B-52 and B-1 bombers and designed to penetrate the potential adversary's air defense and to strike hardened targets deep behind enemy lines.

The B-52C bomber is capable of carrying 12 cruise missiles on underwing pylons, while the B-52H can carry an additional 8 cruise missiles on a rotating launcher within its fuselage. The U.S. Air Force has purchased approximately 1,700 AGM-86B missiles. A total of 104 B-52C and 96 B-52H bombers have been modified or are being modified to carry these missiles.

The AGM-86B missile is of a standard aerodynamic design and is fabricated of aluminum alloys, employment of which provides good strength characteristics and less relative structural weight and cost than if steel and titanium alloys were used.

The missile consists of four sections: a central section, with fuel tank; a nose section, containing an inertial guidance system, a TERCOM system, radar altimeter, aerodynamic computer, temperature probe and pitot-static head; warhead with safety and arming mechanism; tail section with sustainer motor, extensible air intake, thermal batteries, and horizontal tail fin control drives.

Until the missile is released by the launching aircraft, the vertical fin and horizontal fins are folded around the tail section of the missile airframe. The wings, with deployment mechanism, are placed under the central section and are also in a folded configuration until launch. The wing is of a supercritical-section design and deploys to a sweep angle of 25 degrees. The missile has a maximum range of 2,500 km, a top speed of Mach 0.7, flies at a height of 60-150 meters above ground level, is 6.32 meters in length, has an airframe diameter of 0.66 m, a wingspan of 3.66 m, and launch weight of 1,360 kg. The missile carries a W-80 200 kiloton warhead weighing 123 kg.

The AGM-86B missile is powered by an F107-WR-101 turbofan engine producing a thrust of 272 kg. It weighs approximately 65 kg and is 0.3 m in both length and diameter. It is a twin-shaft two-stage low-bypass-ratio engine; fan air is mixed with the primary gases prior to being discharged through a common nozzle. Fuel is fed into the annular combustion chamber via the high-pressure stage shaft, with a swirl injector. Engine start is accomplished with an ignition system employing two capacitive-discharge type spark plugs positioned in the forward zone of the annular combustion chamber. Gaseous oxygen is fed to the plugs to ensure reliable startup of a cold engine at high altitudes.

Flight control is accomplished with horizontal tail fin control surfaces which are deflected symmetrically by DC electric motors to provide pitch control and differentially for yaw and roll control.

The cruise missile is guided during most of its flight by an inertial guidance system, with a system navigational error of 750 m/h. Accumulated error is corrected by adjusting the flight path with the TERCOM terrain contour matching guidance system, which operates according to the following principle.

A map of the cruise missile's route of flight is prepared, divided up into grid squares. An averaged ground surface elevation value is placed in each grid square. This process produces a digital area map containing a set of numbers, each of which corresponds to the elevation of a point on the earth's surface with known coordinates. A set of maps obtained from surveillance satellites, of various resolution, is fed into the missile's onboard digital computer.

Information on the terrain above which the missile is flying is fed into the TERCOM system from the missile's radar altimeter. The computer compares this data with terrain data stored in the computer, determines missile position error, and applies a correction command to the automatic pilot, which returns the missile to the desired flight path.

An initial correction is made with a comparatively low resolution (approximately 100 x 100 m), in order to reduce the volume of information being fed into the computer. Along the route of flight there are several correction areas through which the missile sequentially passes. As the missile approaches closer to the target, the size of the terrain area matrices and the grid squares decreases, while resolution increases, as a result of which inertial guidance system errors are corrected at regular

time intervals with increasing accuracy. Programmed flight path maneuvering is performed in order to confuse the enemy's air defense system.

The TERCOM system provides a guidance-to-target circular error probable of several tens of meters. In the opinion of U.S. experts, this is insufficient to destroy a small, hardened target with a low-yield nuclear warhead. These systems are most effective when overflying rough terrain. TERCOM does not operate above sea or ocean; only the inertial guidance system is used.

In order to test TERCOM performance in conditions corresponding to the northern areas of the USSR, an agreement was signed by Canada and the United States, pursuant to which the U.S. Department of Defense was authorized to conduct testing of U.S. missiles in Canadian airspace (in a "corridor" 13 km wide and 2600 km long).

The first missile launches from B-52 bombers over the Beaufort Sea took place at the beginning of 1986. Two cruise missiles traveled 2,500 km and impacted on the Primrose range facility. Subsequent tests were less successful. The sustainer motor of one missile exploded 4 hours and 10 minutes into the flight, 55 km short of the range. The other missile's motor failed to start following separation from the B-52 launch platform, and it was destroyed.

What, in the view of foreign military experts, should be the procedure of combat employment of cruise missiles? Target designation data received from Strategic Air Command Headquarters would be fed into the missile's onboard computer. This data is part of an "Integrated Combined Operations Plan," which covers delivery of one of several primary nuclear strikes. Mission-ready AGM-86B missiles would be slung on pylons and stored on special racks in protective shelters, in which 4 pylons with missiles would be accommodated at one time. A B-52 bomber's precise loadout would be determined a few hours before mission departure.

The missile's target would not be known to the bomber crew. The crew would receive only commands pertaining to place and time of launch and would feed them into the onboard electronic offensive actions support system and then into the missiles. The missiles can be fuzed for an airburst or for explosion on target impact. AGM-86B missiles can be launched automatically, with the aircraft's electronic offensive actions support system (OAS), or manually by the bomber crew at a distance of approximately 350 km from the territory of the potential adversary.

Probable cruise missile flight paths run across an area located between the Baltic Coast on the north and the Swiss border on the south, and can reach targets located at a considerable distance. In order to enhance missile survivability during a three-hour flight, two hours of which will be above the territory of Warsaw Pact nations, they would be launched at night or in adverse weather. The route can be altered in order to bypass known air defense assets deployment areas, which means they can approach the target from practically any direction.

The United States plans to build second-generation ACM air-launched cruise missiles, to replace the AGM-86B. This missile is based on Stealth technology (see article by V. Yefimov, V. Antipov, and V. Lepin entitled "Stealth Technology in U.S. War Plans," AVIATSIYA I KOSMONAVTIKA, No 9, 1986).

The Stealth missiles will be powered by an F112-WR-100 motor, derived from the F107-WR-101. The new powerplant, boasting 40 percent greater thrust and 5 percent lower specific fuel consumption, will increase the missile's range to 3,200 km (to 4,800 km according to some reports).

It is expected that the size and configuration of Stealth technology cruise missiles will be different from present-generation missiles. According to preliminary estimates, the performance of future Stealth cruise missiles launched from rotating fuselage-internal launchers will be inferior to that of the AGM-86B.

At the same time a Stealth cruise missile high-altitude flight profile eliminates a number of problems facing conventional cruise missiles. For example, the flat terrain in the northern part of the USSR presents considerable difficulty to their terrain contour matching guidance system. Experts are of the opinion that if a high-flying Stealth cruise missile is equipped with a combined inertial guidance system coupled to a periodically-operating device for scanning large areas of the earth's surface, this problem can be eliminated.

The adversary can use against low-flying cruise missiles such means of defense as nets stretched across valleys through which the missiles may pass en route into the probable target area. Such a method cannot be employed, however, against high-flying cruise missiles, which execute a steep dive in the terminal phase of their flight.

A digital correlation guidance system operating on the principle of comparison of a standard or reference image and an actual image of the target area, to provide greater target accuracy, has been developed and tested on Tomahawk missiles. A standard image of the target area, converted into digital form, is stored in the missile's digital computer, while the actual image comes from a TV camera.

The system operates only during the terminal phase of a flight, when the missile reaches areas for which standard maps have been prepared. The area covered by these maps is always larger than the area imaged during flight.

According to the program for improving the cruise missile guidance system, an ACM missile may also carry equipment utilizing data from the NAVSTAR global satellite navigation system to correct the missile's position en route. Navigation error ran about 15 meters during tests of cruise missiles equipped with NAVSTAR system receivers. It is also planned to develop a system based on an onboard carbon dioxide laser radar or lidar, providing capability to fly in terrain-following and obstacle-avoidance mode at low level in adverse weather, and also providing terminal guidance against high-priority stationary targets and capability to attack moving targets.

A total of 194 B-1 bombers are to be armed with ACM missiles by 1990. It is believed that these missiles will be an effective component of the U.S. strategic nuclear triad up to the mid-1990's. It is planned to deploy third-generation cruise missiles at that time.

These missiles will be supersonic, able to fly at speeds of about Mach 4.

It is believed that third-generation cruise missiles will carry NAVSTAR navigation gear, target identification devices, and strike evaluation reconnaissance gear. Both B-1B bombers and Stealth technology ATB aircraft are to be armed with these missiles.

The above constitute far-reaching plans of the U.S. military-industrial complex and the reactionary elements supporting it. All is not proceeding smoothly, however. The question of effectiveness of combat employment of cruise missiles remains unresolved.

U.S. experts estimate that 1,350 AGM-86B air-launched cruise missiles may be required to destroy 70 percent of the potential adversary's ICBM launch silos, while 2,650 may be required to destroy 90 percent of these silos. There is no full assurance, however, that all cruise missiles can destroy these targets. Cruise missile guidance accuracy and destructive power may prove insufficient against highly-hardened targets.

Official U.S. Air Force spokesmen state that more than 1,000 AGM-86B air-launched cruise missiles contain guidance system defects plus a number of other deficiencies. During flight tests spurious pulses have occurred in the electronic circuits, leading to diminished guidance accuracy. It was also noted that ECM emissions generated by the B-52 affected operation of the cruise missile's sensitive radar altimeter on launch. There were instances of cruise missile motor shutdown during the tests, caused by the B-52's ECM emissions.

In spite of these and other shortcomings, however, some U.S. experts propose shifting the bulk of U.S. strategic potential to "slow flying systems"—aircraft and cruise missiles. Appeals calling for further strengthening U.S. strategic might, in the hopes of gaining military superiority over the Soviet Union, continue to ring out from the halls of the Pentagon.

Only the future will tell how events are to evolve. One thing is sure: if NATO proceeds with "modernizing" nuclear weapons, this cannot help but affect future prospects for improving Soviet-American relations and cannot help but diminish the value of much of what was achieved with the INF Treaty.

Articles Not Translated From AVIATSIYA I KOSMONAVTIKA No 7, July 1989

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